FY 2019 Faculty Development Grant Awards

Institution	Amount	Title
University of Michigan	$450,000	Nuclear Engineering Faculty Development Program at the University of Michigan
Brigham Young University	$450,000	Faculty Development Program to Integrate New Faculty in Nuclear Engineering Research at Brigham Young University
North Carolina State University	$450,000	Faculty Development Program in Nuclear Engineering at North Carolina State University
Pennsylvania State University	$450,000	Faculty Development Grant for Advanced Thermal-Hydraulics and Computational Fluid Dynamics
University of California, Davis	$450,000	University of California, Davis Advancing Scientific Careers to Enhance Nuclear Technologies (ASCENT)
University of Central Florida	$450,000	Faculty Development for Radiochemistry Program at the University of Central Florida
University of Illinois	$450,000	University of Illinois at Urbana-Champaign Nuclear Engineering Education Faculty Development Program
University of Tennessee	$450,000	Faculty Development Program in Nuclear System Modeling and Simulation at the University of Tennessee
University of Wisconsin, Madison	$450,000	University of Wisconsin-Madison Faculty Development Program in Nuclear Engineering
Utah State University	$431,628	FACULTY DEVELOPMENT PROGRAM TO INTEGRATE NEW FACULTY IN NUCLEAR ENGINEERING RESEARCH AT UTAH STATE UNIVERSITY
Virginia Polytechnic Institute and State University	$450,000	Faculty Development Program in Nuclear Engineering at Virginia Tech

Nuclear Engineering Faculty Development Program at the University of Michigan

Executive Summary:

The objective of this program is to provide up to three years of financial support to two new junior faculty members, helping them to succeed as faculty members in their academic career at the University of Michigan.

This program will benefit the junior faculty members by providing them critical financial support early in their academic careers, including: (1) summer support to prepare teaching materials and research grants, (2) support for graduate students early in the faculty members' academic careers, (3) support for supplies and research equipment critical for the faculty members' research, and (4) funds to travel to conferences to present papers and interact with colleagues. All of these items will contribute towards the success of the faculty members in becoming national technical leaders and to obtain tenure in Nuclear Engineering and Radiological Sciences at the University of Michigan.

Principal Investigator: Gary Was, gsw@umich.edu

Faculty Development Program to Integrate New Faculty in Nuclear Engineering Research at Brigham Young University

Executive Summary:

The objective of the Brigham Young University's (BYU) Faculty Development Plan is to expand the existing nuclear engineering specialty into the Mechanical Engineering (ME) department to meet our aim of becoming a leader in Molten Salt Reactor (MSR) technologies. It will do this by supporting a newly hired, tenure track assistant professor with expertise in characterizing heat transfer in solid and liquid materials. He will be responsible for establishing an interdisciplinary Nuclear Research Group at BYU. The proposed program has the following goals:

1) Expand BYU's nuclear research and education capacity into the MeEn department by developing mentored research and teaching opportunities for a highly qualified faculty member with expertise in thermal characterization.
2) 2) Establish the new faculty's research program to develop cross-disciplinary teams at BYU and INL.

The development plan will support the faculty to build a state-of-the-art laboratory, recruit and mentor students, design new courses, and establish mentorships and collaborations with industry and nearby national lab partners. Building on the success of the previous BYU Faculty Development Program in creating a strong foundation, this new faculty development plan will expand BYU's nuclear research and capability to train a growing nuclear engineering workforce.

Principal Investigator: R. Daniel Maynes, maynes@byu.edu

Faculty Development Program in Nuclear Engineering at North Carolina State University

Executive Summary:

The Department of Nuclear Engineering at North Carolina State University (NCSU) was previously awarded NRC faculty development grants, which have been extremely beneficial to the development and success of our tenure-track faculty to advance in their academic careers.

We advertised for **TWO** new faculty positions and are recruiting and interviewing new entry-level faculty, one in the area of advanced nuclear reactors and the second is in any of our primary research areas: Nuclear Power Design, Safety Analysis, Radiation Science, Plasma Science, Nuclear Materials, Waste Forms and Storage, Nuclear Security and Non-Proliferation, and Nuclear Computer Science. The NRC faculty development program will help us supporting the newly hired faculty of the highest caliber. Upon hiring, and with the NRC award plus what we provide as a startup package, the hired junior faculty will be supported and helped to establish their academic career with the help of the senior faculty mentorship. A measure of the NRC faculty development award will be realized when the tenure-track faculty successfully advances towards tenure and promotion to higher ranks, and earning a reputation within the nuclear engineering institutions. For our department of nuclear engineering, which is ranked number 4 among other nuclear departments nation-wide, it is a great benefit to hire top talent young faculty in the open positions and to retain them with our expansion in all nuclear engineering main thrust research areas.

Principal Investigator: Kostadin Ivanov, knivanov@ncsu.edu

Faculty Development Grant for Advanced Thermal-Hydraulics and Computational Fluid Dynamics

Executive Summary:

Nuclear energy is 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 emissions1. The ability to extract the heat from the core in an economical and safe manner is essential to the continued operation of nuclear power. In particular, the analysis of thermal hydraulics phenomena (fluid flow, heat transfer) and its influence on mechanical behavior of the fuel assembly, as well as on reactor physics through thermal neutronic feedback, can be increasingly studied with advanced codes. In particular multiphase computational fluid dynamics allows studying such phenomena with increasing accuracy, to reduce margins, and increase safety and efficiency of nuclear power operations.

This proposal seeks start-up funds for a new, tenure-track faculty member in the newly formed Department of Nuclear Engineering with expertise in the field of Advanced Thermalhydraulics. The candidate has accepted an offer to join Penn State next year as a tenure track associate professor of nuclear engineering. 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 by helping fund his access to the high performance computing facilities he needs.

Principal Investigator: Arthur T. Motta, atm2@psu.edu

University of California, Davis Advancing Scientific Careers to Enhance Nuclear Technologies (ASCENT)

Executive Summary:

The aim of the ASCENT program at UC Davis is to develop a new generation of faculty engaged in interdisciplinary nuclear materials science research by creating a unique platform of individualized training and team-based mentorship. This program builds on existing expertise at the state-of-the art facilities at UC Davis, namely, McClellan Nuclear Research Center and Crocker Nuclear Laboratory. It will also focus on training doctoral students who are engaged in research on nuclear materials through a Designated Emphasis in Nuclear Science (DENS), which is a formal interdisciplinary minor for doctoral students. The ASCENT program will initially support two recently hired, pre-tenure faculty participants who will engage in research on radiation damage in oxide heterostructures to develop radiation tolerant devices, and adsorption processes in uranium based nuclear waste and their relation to structural, electronic, thermodynamic and morphology control of iron oxides. The program will initiate new collaborations by supporting travel to professional meetings and other universities with nuclear science programs. The ASCENT program will also invite speakers to UC Davis to interact with the broader nuclear science research community on campus. To aid the junior faculty in establishing new research directions in nuclear science, the program will support graduate student researchers working with each of them. The success of this program will be evaluated based on (i) research productivity (talks, journal articles, research collaborations), (ii) mentoring graduate and undergraduate students in nuclear science and (ii) securing independent research funding for projects in nuclear materials science. Quarterly feedback and guidance will be provided by an executive advising committee consisting of five senior faculty involved in nuclear science at UC Davis.

Principal Investigators: Jeffery C. Gibeling, jcgibeling@ucdavis.edu

Faculty Development for Radiochemistry Program at the University of Central Florida

Executive Summary:

The objective of this proposal is to support the development and retention of a highly qualified early career professor, Dr. Vasileios Anagnostopoulos, in the field of Radiochemistry at the Department of Chemistry at the University of Central Florida. This position aims to address the country's current shortage of expertise and workforce in the field of Radiochemistry. To this end, UCF recruited an assistant professor in Radiochemistry) in order to educate and train students who will later on join the nuclear workforce, establish a vigorous externally funded research program in Radiochemistry and develop nuclear curriculum.

UCF's capacity (2nd largest university in the US in enrollment) and role as a research intensive minority serving institution make it an ideal candidate for a faculty development grant on the field of radiochemistry. The proposed project will facilitate the inclusion of minorities and underrepresented groups in the evolution of nuclear science and technology. Furthermore, the proposed project focuses on radionuclide migration and groundwater contamination, as well as used nuclear fuel disposal and waste forms, topics that clearly align with NRC's Program Objectives and Mission. UCF has matched 39% of the requested funds demonstrating its strong commitment to the growth of the field of radiochemistry. Furthermore, UCF provides a comprehensive mentoring and evaluation plan in departmental, college and institutional level

Principal Investigator: Cherie Yestrebsky, Cherie.Yestrebsky@ucf.edu

University of Illinois Nuclear Engineering Faculty Development Program

Executive Summary:

This program is designed to help develop recently hired junior faculty member Assistant Professor. The new hire works in the area of development of innovative and advanced radiation detectors with applications at nuclear power plants, homeland security, and imaging and sensing. This research area is among the areas identified by NRC in the RFA. The resources from this program will be used exclusively to help the new hire who joined our faculty in August 2018—establish productive university career in nuclear engineering education and research, and to support her to establish strong teaching, research and professional service activities. The financial resources will be used for: (a) faculty summer salary support, (b) graduate student support associated only with the new faculty member, (c) acquisition of critical research and teaching equipment, and (d) travel and conference attendance. Matching support provided by the Department will be used for: (a) graduate students to work with the faculty research and teaching efforts, and (b) research facilities and lab remodeling support. The Department will also provide resources to support the development of the new faculty member, including mentoring, performance evaluation, teaching support, and research support.

Principal Investigator: Rizwan Uddin, rizwan@illinois.edu

Faculty Development Program in Nuclear System Modeling and Simulation at the University of Tennessee

Executive Summary:

The University of Tennessee Nuclear Engineering (UTNE) Department has a well-established and successful relationship with the US Nuclear Regulatory Commission's (US NRC's) Nuclear Education Grant Program that dates back to its inception. This synergistic relationship has supported several junior faculty members at UTK, of which 6 have already successfully acquired the rank of tenured Associate Professor, with 3 on track for tenure. The impact of the US NRC's grant program upon our Nuclear Engineering Department is evident and will benefit the nation, as these 9 individuals represent educators and researchers who will play key roles in the development of our future nuclear workforce and thus supporting the design, construction, operation, and regulation of nuclear facilities and the safe handling of nuclear materials for years to come. The objective of this program is to develop our newest faculty member to achieve excellence in research, teaching, and service; with an emphasis on NRC topics of interest and need.

The requested funding from the NRC is $450,000 over a 3-year period. This budget includes support for new course development, research proposal support, professional society meetings participation, research paper preparation and publication, travel, graduate student support, equipment, supplies, and other scholarly needs.

Principal Investigator: J. Wesley Hines, jhines2@utk.edu

University of Wisconsin-Madison Faculty Development Program in Nuclear Engineering

Executive Summary:

The proposed faculty development program consists of both research and curriculum development support, paired with a mentoring program for this mechanical engineering junior faculty who has an affiliate appointment with the nuclear engineering program in the Department of Engineering Physics. The development of a robust faculty research and teaching program requires several elements that will be supported by this proposal. These elements include: 1) faculty summer salary support, 2) support for graduate students or post-doctoral fellows, 3) travel support for faculty and students to participate in technical symposia and research program development, and 4) key equipment purchases and materials/supplies for unique laboratory capability. Our nuclear engineering program at the University of Wisconsin-Madison (UWMadison) also augments faculty support with operation of common research equipment and/or access to key UW-Madison user facilities, such as the UW Nuclear Reactor Lab, the Extreme Environments Lab, the Materials Science Center and the Thermal Hydraulics Lab. In our program, the mentor committee consisting of the Department Chair and key nuclear engineering faculty will work together with the assistant professor to assist them in their growth as a valuable member of the faculty and UW-Madison academic community. The faculty mentoring committee provides formative feedback to the assistant professor on their strengths and weaknesses in teaching, research and service and will suggest strategies and techniques for improvement if needed. It will also assist them in discovering opportunities and developing strategies for their growing research program. Finally, the faculty mentoring committee will serve as an advocate for the assistant professor to promote visibility nationally and internationally on their work as a nuclear engineering researcher and scholar.

Principal Investigator: Douglass Henderson, dlhender@wisc.edu

FACULTY DEVELOPMENT PROGRAM TO INTEGRATE NEW FACULTY IN NUCLEAR ENGINEERING RESEARCH AT UTAH STATE UNIVERSITY

Executive Summary:

Utah State University's Faculty Development Program is focused on two newly hired tenure-track assistant professors that will strengthen and expand USU's nuclear research and future workforce contributions. Dr. Hailei Wang has expertise for developing hybrid energy systems, advanced power cycles and high-performance heat exchangers, which will contribute to the advancement and deployment of both light-water small modular reactors and sodium fast reactors. Dr. Geordie Richards's expertise is in stochastic modeling and quantifying process uncertainty, which will improve the understanding of fuel performance under potential accident conditions. These two new faculty members complement and expand existing expertise within the Mechanical and Aerospace Engineering Department such that a nuclear engineering emphasis option can be included in its ABET accredited mechanical engineering BS degree. Moreover, their research will be integrated into the newly established Thermal Hydraulics and Materials Properties (TMP) Research Center.

Specifically, the proposed program:
1) Expands MAE's nuclear research and education capacity by cultivating research and teaching opportunities for two new highly qualified faculty members with diverse expertise for nuclear energy systems,
2) Establishes the new professors' research programs as integral elements of TMP to further enable collaboration within the nuclear research community and sustained research success.

As the previous USU Faculty Development Programs provided essential support that enabled nuclear engineering research and education to achieve critical mass and momentum at USU, this new Faculty Development Program will strengthen and expand USU's nuclear research and future workforce contribution to new levels.

Principal Investigator: Barton Smith, barton.smith@usu.edu

Faculty Development Program in Nuclear Engineering at Virginia Tech

Executive Summary:

The goal of this faculty development proposal is to support the professional development of the new assistant professor in the Nuclear Engineering Program at Virginia Tech. The Mechanical Engineering Department hired the new junior tenure-track faculty in August 2018 through the Intelligent Infrastructure for Human-Centered Communities (IIHCC) Destination Area. The IIHCC Area is a transdisciplinary initiative that aims to balance our technological advancement to a fair, equitable and suitable society. In this context, the nuclear energy plays an important role in a carbon-constrained world with new, advanced, more economical, proliferation resistant, and safer nuclear power plants. The junior faculty will expand the Nuclear Engineering Program computational and experimental capabilities in thermalhydraulics and safety of advanced nuclear reactors. A mentor committee and the department head will monitor and provide guidance for the development of this program towards her tenure and promotion.

Principal Investigator: Azim Eskandarian, eskandarian@vt.edu