

DOE-FIU COOPERATIVE AGREEMENT

The DOE-FIU Cooperative Agreement is a multi-year activity at Florida International University's (FIU's) Applied Research Center (ARC). Since a memorandum of understanding with the Department of Energy's Office of Environmental Management (DOE-EM) and Office of Legacy Management (DOE-LM), FIU has developed expertise and specialized facilities through its dedicated scientific and engineering work in developing solutions for EM and LM in multiple high priority areas such as D&D, soil and groundwater remediation, and high-level waste.

Focus Areas:

- Radioactive waste processing
- Soil and groundwater remediation
- Deactivation and decommissioning
- Knowledge management, Artificial Intelligence/Machine Learning
- Robotics
- Workforce Development and training

2022-2023 Project Task Research Descriptions:

- Project 1: Chemical Process Alternatives for Radioactive Waste
- Project 2: Environmental Remediation Science & Technology
- Project 3: Waste and D&D Engineering and Technology Development/AI and IT Tools for DOE EM
- Project 4: DOE-FIU Science & Technology Workforce Development Program
- Project 5: Long-Term Stewardship of Environmental Remedies: Contaminated Soils and Water and STEM Workforce Development

Recent Accomplishments:

- Deployed FIU's min-rover inspection tool at DOE's Hanford Tank Farm (March 2022 – Tank AP-105).
- Completed experiments that prove Ca- and grout-contacted solution inhibits glass dissolution when cementitious waste forms are placed above glass waste forms in proposed lysimeter configuration at Hanford.
- Developed integrated models for two basins at SRS and Basin 6 west of the WIPP that can simulate hydrological response during extreme precipitation events and enable assessment of the impact of climate change on transport of existing heavy metal contaminants.
- Successfully down-selected and currently testing a foam plug technology intended to support decommissioning activities at the F/H labs courtyard.
- Developed AI/ML models for EM problem set (soil and groundwater) to support ALTEMIS project, focusing on sensor data from wells at the SRS F-Area in collaboration with LBNL and SRNL.

DOE-FIU Cooperative Agreement
Performing research under the DOE-FIU Cooperative Agreement, the Applied Research Center at Florida International University provides critical support to the Department of Energy's Office of Environmental Management mission of accelerated risk reduction and cleanup of the environmental legacy of the nation's nuclear weapons program.

STATISTICS:
 - 1st in nation in awarding bachelors and master's degrees to Hispanic students
 - 10th largest U.S. public university by enrollment
 - 54,000 enrolled as Fall 2023
 - Ranked as a Top Tier Research University by Carnegie Classification
 - BEST COLLEGES
 - US NEWS

RESEARCH AREAS:
 - High-Level Radioactive Waste / Waste Processing: Investigate solutions in the areas of tank management, milling and processing, waste transport, and characterization for high level waste at Hanford, Savannah River, and Idaho. Conduct experimental research, computational modeling, and technology development/prototyping in support of these efforts.
 - Environmental Remediation: Perform laboratory experiments to develop strategies to improve the efficiency of contamination stabilization in the subsurface. Model the fate and transport of contaminants, sediments, surface water, and groundwater. Develop sustainability strategies for remediation systems at DOE facilities.
 - Deactivation & Decommissioning / Information Technology: Evaluate existing technologies and develop new technology alternatives for the D&D of legacy facilities throughout the DOE complex to reduce technical risks, improve safety, and limit uncertainty. Develop Artificial Intelligence solutions for the problem set in D&D and Soil and Groundwater. Collaborate system development for DOE Knowledge Management and Waste Management.
 - STEM Workforce Development and Training: Advanced program designed to educate students of minority backgrounds and engineers specifically trained and evaluated to enter the DOE workforce. Students (DOE Fellows) perform DOE EMLM related research projects in FIU with an summer internship at DOE Headquarters, DOE sites, and national laboratories.

KNOWLEDGE SHARING:
 - doeresearch.fiu.edu
 - emwms.org
 - dndkm.org
 - fellows.fiu.edu

ACADEMIC TALENT:
 - Post-DOEs Faculty: 56
 - STEM Students: 29
 - Current Professional Accreditations: 30 (5 BS/Other, 8 Masters, 17 PhDs)
 - Current STEM Students: 29 (18 BS, 5 Masters, 6 PhDs)

FACILITIES & CAPABILITIES:
 - Multifunction Technology Deployment & Testing Facility: Provide major high-level facility for large-scale health, safety, and technology prototyping and testing.
 - Engineering Design Center: Drafting, design, engineering, prototyping, and testing.
 - Radiation Laboratory: Perform facility with 1000 Ci source. State-of-the-art glass basins. Radioactive material storage.
 - Artificial Intelligence, GIS & Cybersecurity: Feature several services including big data, data intelligence, Business Intelligence, Cybersecurity, and GIS Lab.
 - Machine Shop: Feature CNC machines and traditional machine tools. Prototype manufacturing, industrial and semi-conductor production.
 - Technology Testing & Demo Facility: Outdoor facility to conduct large scale testing and demonstration of technologies, hot cell work, and test cells.
 - Robotics & Sensors Laboratory: Development of innovative sensors, measuring, maintenance and new technologies for contaminated facilities.

CONTACTS:
 - Technical Contact: Dr. Leonel Lagos, Director of Operations, ARC, FIU Applied Research Center, 10555 W. Flagler Street, EC 2100, Miami, FL 33174, Tel: 305-348-4238, Fax: 305-348-1810.
 - Address and Phone: Applied Research Center, Florida International University, 10555 W. Flagler Street, EC 2100, Miami, FL 33174, Tel: 305-348-4238, Fax: 305-348-1810.
 - Website and Social Media: <http://www.arc.fiu.edu>, <https://www.facebook.com/arc.fiu/>, <https://twitter.com/arc.fiu>, <https://www.youtube.com/channel/UC1332021>

ABOUT

Since 1995, the Applied Research Center at Florida International University has provided critical support to the Department of Energy's Office of Environmental Management mission of accelerated risk reduction and cleanup of the environmental legacy of the nation's nuclear weapons program. ARC's research performed under the DOE-FIU Cooperative Agreement (Contract # DE-EM0005213) can be classified as fundamental/basic, proof of principle, prototyping, and laboratory experimentation.

Project Contact:
 Dr. Leonel Lagos (PI)
 Ph: (305) 348-1810
 Email: lagosl@fiu.edu
 10555 W. Flagler Street, EC 2100
 Miami, FL 33174
 arc.fiu.edu

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DOE-FIU Science and Technology Workforce Development Program:

The DOE-FIU Science and Technology Workforce Development Program is an innovative program between the U.S. Department of Energy's Office of Environmental Management (DOE-EM), Office of Legacy Management (DOE-LM), and Florida International University's Applied Research Center designed to create a "pipeline" of minority engineers specifically trained and mentored to enter the DOE workforce in technical areas of need. This innovative program was designed to help address DOE's future workforce needs by partnering with academic, government and DOE contractor organizations to mentor future minority scientists and engineers in the research, development, and deployment of new technologies addressing DOE's environmental cleanup challenges. Students selected as DOE Fellows perform DOE-EM/LM related hands-on research at FIU by working alongside FIU ARC's scientists and engineers as well as with FIU faculty.

Benefits:

- Students gain professional development/work experience via hands on research alongside ARC and FIU scientists.
- 10-week internships at DOE national labs.
- Opportunities for graduate students to develop Master's thesis and/or PhD dissertation topics with direct supervision of ARC scientists and FIU faculty.
- Students develop presentation skills by showcasing their research via oral/poster presentations.
- Opportunities for students to seek employment with DOE, DOE national labs, and DOE contractors.

Accomplishments:

- 203 FIU STEM minority students inducted as DOE Fellows since program inception (199 EM, 4 LM).
- 35 Fellows hired by DOE (EM, Nat. Labs, contractors), other federal agencies, state/local government agencies:
 - (3)-DOE EM HQ, (9)-DOE national research laboratories, (1)-NNSA, (3)-private contractors for EM, (19)-other federal, state or local governments including: DoD, NASA, Dept. of Commerce, FDEP, DERM, NAVSEA.
- 82 DOE Fellows graduated FIU with BS/MS degrees and obtained employment in STEM industry, including FPL, GE, Lockheed Martin, Raytheon, Texas Instruments, and others. Hiring rate for DOE Fellows is over 97%.
- 194 internships completed at DOE sites and national labs (SRS, ORNL, DOE ORO, PNNL, LLNL, INL, and Hanford), DOE HQ, DOE-LM and DOE contractors.
- Over 300 student posters and professional presentations given at national & international conferences (e.g., Waste Management Symposia, American Nuclear Society, etc.).
- 81 DOE Fellows have continued to obtain Master's or PhD degrees at FIU and other institutions.
- DOE Fellow selected to conduct a 1-yr internship at the IAEA, Vienna, Austria (Spring 2016).

