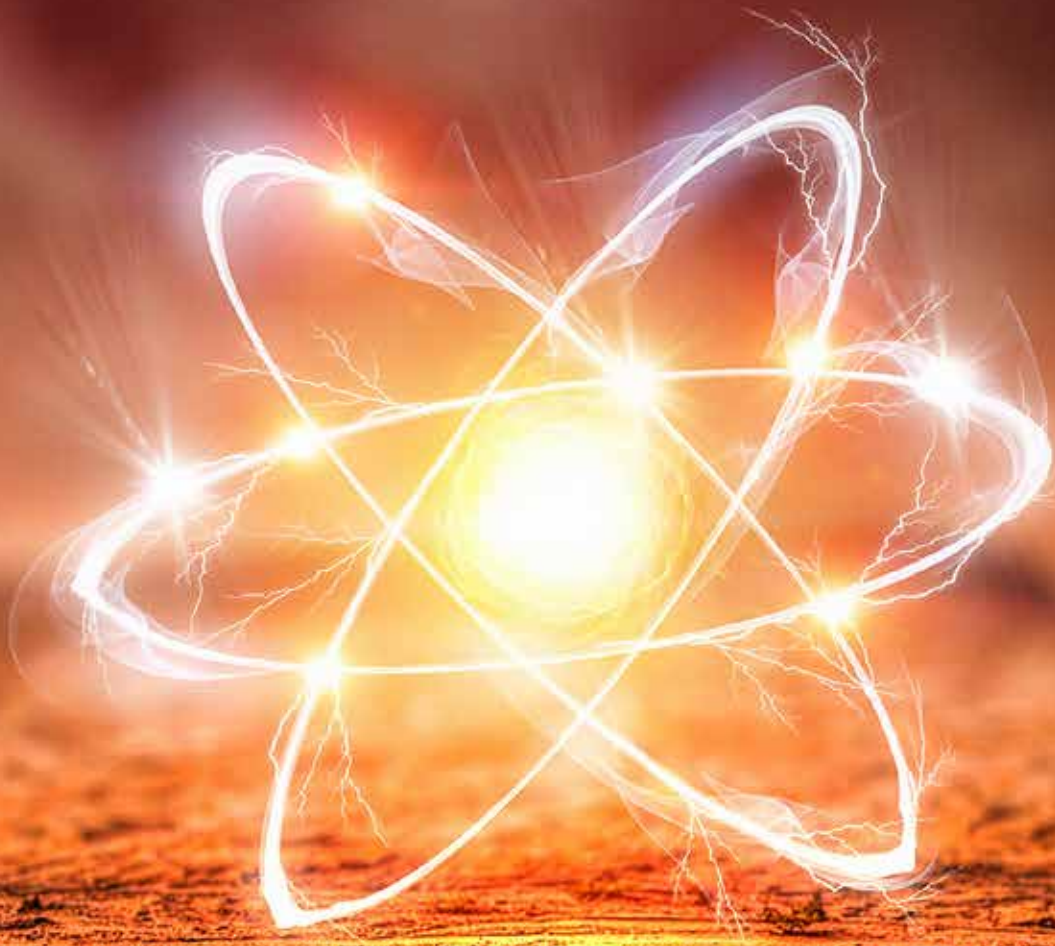


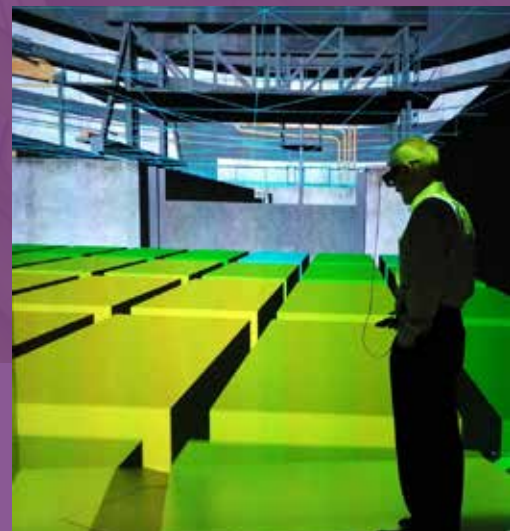
NUCLEAR ENGINEERING



COLLEGE OF ENGINEERING
MECHANICAL ENGINEERING
VIRGINIA TECH.

Nuclear Engineering Program Facilities

- ☢ Dedicated Compute Cluster (operated by VT3G)
- ☢ Dedicated Server for VRS-RAPID
- ☢ Advanced Research Computing
- ☢ Visionarium (pictured)
- ☢ Center for Neutrino Physics - CHANDLER Project
- ☢ Molten Salt Chemistry Loop
- ☢ Two-Phase Visualization and Measurement Loop
- ☢ High-Temperature Water Loops
- ☢ Access to the US Naval Academy
- ☢ Nuclear Materials & Fuel Cycle Laboratory
- ☢ Advanced Nuclear Coolant Corrosion and Chemistry



From the Department Head

AZIM ESKANDARIAN
NICHOLAS AND REBECCA DES CHAMPS CHAIR
MECHANICAL ENGINEERING



When the Nuclear Engineering program was re-instituted at Virginia Tech in 2007 it was on the heels of the nuclear industry's need for trained personnel, and the country's need for vigorous research into areas such as nuclear safety, non-proliferation, and the need to improve our nation's nuclear infrastructure. As a land grant university, Virginia Tech has strived to meet the growing and changing needs of the nation in a variety of areas such as engineering, science, and agriculture, to name a few.

Today, Virginia Tech's Nuclear Engineering program is a leader in the field and boasts world-class laboratories at Virginia Tech's main campus in Blacksburg as well as in the National Capitol Region. Our laboratory and experimental capabilities are complemented with partnerships with a number of national labs. In addition, the program is part of a collaborative effort with universities, government agencies, national laboratories, and industry, to meet the challenges of climate change - challenges which cannot succeed without the safe, effective and peaceful use of our nation's nuclear power facilities. Our renowned faculty and their students are conducting some of the most exciting and impactful research in nuclear engineering.

The growing importance of nuclear energy, safety, and non-proliferation, can be seen in the great interest in our program, which has in only four years, begun producing masters and doctoral-degree holders who will help lead our nuclear policy into the future. In addition to nuclear engineering students, highly qualified students from diverse backgrounds in engineering, physics, and sciences with sufficient preparation can join our graduate program in Nuclear Engineering within the Department of Mechanical Engineering.

Please browse through this brochure for an overview of our program. I invite you to join us at VT in this exciting journey to invent and shape the future of nuclear engineering and sciences with some of the best faculty and expertise in the field.



Collaborations

☢ Nuclear Education Hub

George Washington University

☢ Benchmarking of RAPID code system

The Jozef Stefan Institute, Slovenia, TRIGA
Research Reactor

☢ Multiphysics for Advanced Reactor Simulation (MARS) Center

Georgia Tech
Pennsylvania State University
North Carolina State University
Jozef Stefan Institute
Dept. of Mechanical Engineering
Dept. of Materials Science Engineering
Dept. of Physics

☢ Center for Neutrino Physics-Optimization of the antineutrino CHANDLER detection

Advanced Materials Research
Idaho National Laboratory
Los Alamos National Laboratory
Oak Ridge National Laboratory
University of Wisconsin
Massachusetts Institute of Technology
University of Utah

☢ Nuclear Fuel Cycle Research

Idaho National Laboratory
Georgia Tech
Oregon State University
Rensselaer Polytechnic Institute
Massachusetts Institute of Technology
Ohio State University
Argonne National Laboratory
Oak Ridge National Laboratory

☢ Nuclear Policy Education

VT School of Public and Intl. Affairs
Dept. of Science, Technology & Society

☢ Research and education collaboration and sharing facilities

US Naval Academy

☢ Virtual Reality Systems for nuclear fuel cycle

VT Visionarium-Advanced Research
Computing

☢ Virginia Nuclear Energy Consortium

Dominion
EnFission
Newport News Shipbuilding
Virginia Commonwealth University
Virginia Tech

A short history of nuclear engineering at Virginia Tech

The Nuclear Engineering Program was first established at Virginia Tech in 1956 as part of the Physics Department. The program, which moved to Mechanical Engineering, offered degrees until 1985.

In 2007, the decision was made to re-establish the program and approval was gained for VT to offer graduate degrees in nuclear engineering in 2014.

In 2011, Professor Alireza Haghighat established the Nuclear Science and Engineering Lab in the National Capitol Region in Arlington, Virginia, operating under the auspices of the Institute for Critical Technology and Applied Science and the Mechanical Engineering department.

In 2017-2018 the program graduated one Ph.D. and five Master's students in Nuclear Engineering, and one Ph.D. with a Nuclear Engineering option. At any given time the program is home to around twenty students, most of whom are funded through fellowships, research assistantships, or teaching assistantships.

The program has received around \$3 million in research and education awards from organizations including the Department of Energy, Nuclear Regulatory Commission, Air Force Office of Scientific Research, Bettis Atomic Power Lab, Babcock & Wilcox, Bechtel, Newport News Shipbuilding, and Sandia National Lab.



For Students

The nuclear engineering program has courses at both Blacksburg and in the National Capitol Region. Applicants interested in joining the Nuclear Engineering program will require:

- A minimum target grade point average of 3.2/4.0, or better for either the BS degree or in the last 60 hours of course work
- GRE target scores of:
 - 150, Verbal
 - 165, Quantitative
 - 4.5, Analytical
- Students who are not native English speakers must also take the internet-based TOEFL, IELTS, or have completed a degree from an English speaking institution.
- Minimum target scores:
 - 100 Total
 - 26 Reading and speaking areas
- Final admissions are made on a holistic evaluation of a candidate's application materials, research experience and three letters of recommendation, which are a significant part of the evaluation.
- The Nuclear Engineering program falls under the Department of Mechanical Engineering, and while the program processes applications on a rolling basis, students should be aware of the department's deadlines to be considered for admission and for assistantships/fellowships.
- Fall term deadline: Jan. 5
- Spring term deadline: Oct. 1

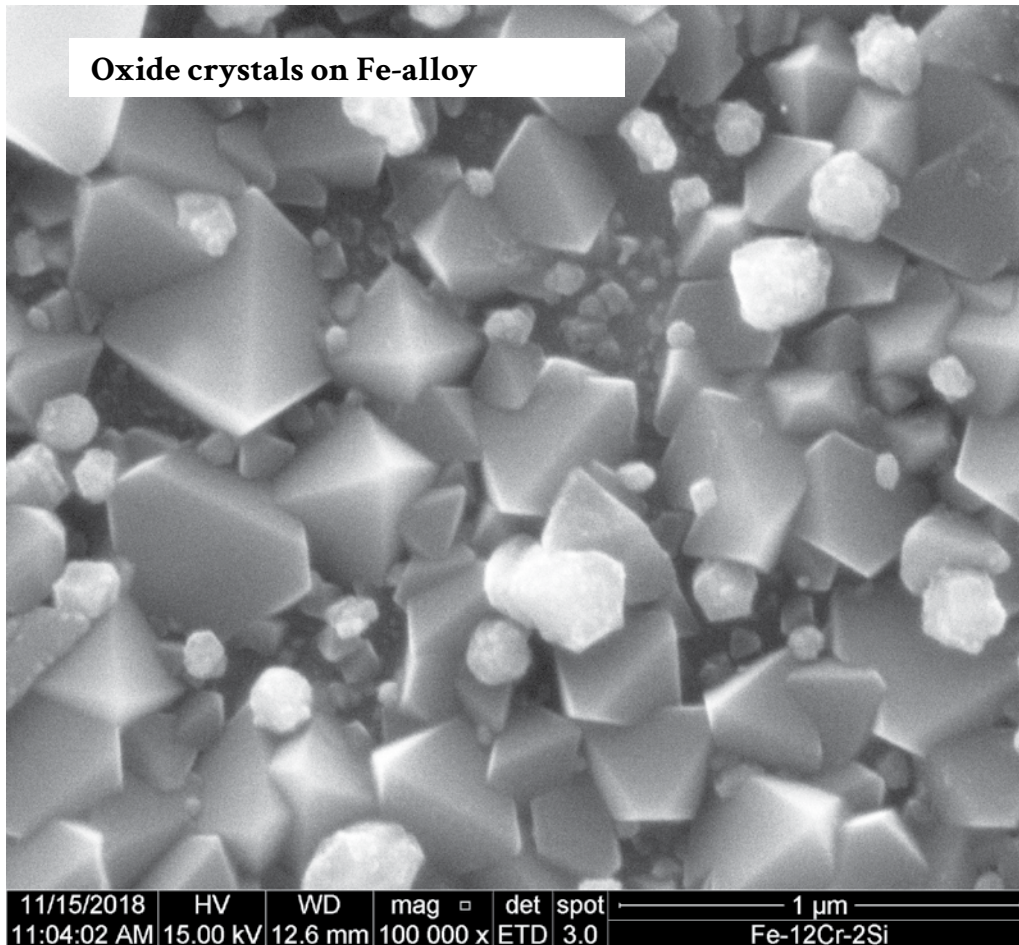
For more information, visit the program's web page at:

<https://nuclear.ncr.vt.edu> or contact Professor Alireza Haghighat, program director, Cathy Hill, graduate program coordinator, or Annette Ben-Tzvi, graduate academic advisor.

Research Activities

The research activities of the Nuclear Engineering Program address the applications of nuclear science and engineering to: ***Power, Security, Medicine, and Policy***, with subject areas including:

- ☢ Nuclear materials and fuel cycle
- ☢ Reactor physics
- ☢ Radiation detection
- ☢ Thermal-hydraulics & reactor safety
- ☢ Particle transport methods
- ☢ Reactor shielding
- ☢ Advanced coolant chemistry, corrosion and control



Faculty research highlights include:

- ☢ Advanced transport methods
- ☢ Applications in reactor physics analysis and design
- ☢ Radiation shielding
- ☢ Nuclear security
- ☢ Medical imaging
- ☢ Nuclear safety
- ☢ Thermal-hydraulic systems
- ☢ Advanced light water reactors
- ☢ Two-phase flow modeling
- ☢ Advanced passive safety system design
- ☢ Non-proliferation and safe guards
- ☢ Nuclear power plant operations and safety
- ☢ Nuclear materials compatibility
- ☢ Nuclear fuel materials
- ☢ Nuclear fuel cycle technology
- ☢ ...and much more

Degrees Offered

- ☢ Doctor of Philosophy (Ph.D.)
- ☢ Master of Science (MS)
- ☢ Master of Engineering (MENG)
- ☢ Accelerated MENG for US Naval Academy
- ☢ Graduate Certificate (GC) in NE
- ☢ Graduate Certificate in Nuclear Science, Technology and Policy (NSTP)



FullTime Nuclear Program Faculty



Dr. Alireza Haghighat - Professor & Director

PhD-Nuclear Engineering, University of Washington, 1986
Chairman of the Board, Consortium (VNEC)
<https://nuclear.ncr.vt.edu/about/people/alireza-haghighat>



Dr. Juliana Pacheco Duarte - Assistant Professor

PhD-Nuclear Engineering and Engineering Physics,
University of Wisconsin-Madison, 2018; 2014-2018 CAPES Science Without Borders Fellow;
<https://nuclear.ncr.vt.edu/about/people/duarte>



Dr. Celine Hin - Associate Professor

PhD-Materials Science, Institut Polytechnique de Grenoble and
Commissariat à l'Energie Atomique
<https://nuclear.ncr.vt.edu/about/people/celine-hin>



Dr. Yang Liu - Assistant Professor

PhD-Nuclear Engineering, Purdue University, 2008.
<https://nuclear.ncr.vt.edu/about/people/yang-liu>



Dr. Mark Pierson - Associate Professor of Practice

PhD-Mathematics, Virginia Tech, 2005.
<https://nuclear.ncr.vt.edu/about/people/mark-pierson>



Dr. Jinsuo Zhang - Professor

PhD-Engineering Mechanics, College of Mechanical and Energy, Zhejiang University, China, 2001.
<https://nuclear.ncr.vt.edu/about/people/jinsuo-zhang>

Affiliated Faculty



Dr. Tomonari Furukawa

Professor, Mechanical Engineering
PhD-University of Tokyo, 1996



Dr. Michael von Spakovsky

Robert E. Hord Jr. Professor,
Mechanical Engineering
PhD-Georgia Institute of
Technology, 1986



Dr. Roop Mahajan

Lewis A. Hester Chair,
Mechanical Engineering
PhD-Cornell University, 1977



Dr. Ranga Pitchumani

George R. Goodson Professor,
Mechanical Engineering
PhD-Carnegie-Mellon University,
1992



Dr. Danesh Tafti

William S. Cross Professor,
Mechanical Engineering
PhD-Pennsylvania State University,
1989



Dr. Diana Farkas

Professor, Materials & Science
Engineering
PhD-University of Delaware, 1980



Dr. Jonathan Link

Professor, Physics
PhD-University of California, Davis,
2001



Dr. Patrick Huber

Professor, Physics
PhD-Technische Universität
München



Dr. Camillo Mariani

Associate Professor, Physics
PhD-University of Rome
"La Sapienza"



Dr. Patrick Roberts

Associate Professor, Public and
International Affairs
PhD-University of Virginia, 2006



Dr. Sonja Schmid

Associate Professor, Science,
Technology & Society
PhD-Cornell University

Nuclear Engineering Program
Northern Virginia Center
Virginia Tech
7054 Haycock Road
Falls Church, VA 22043

Non-Profit Org
U.S. POSTAGE
PAID
Blacksburg, VA
24060
Permit No. 28

Offering Ph.D., MS, and M.Eng.

Accelerated MS program for the U.S. Naval Academy

Graduate Certificate in Nuclear Engineering

Graduate Certificate in N. Sci., Technology & Policy



COLLEGE OF ENGINEERING
MECHANICAL ENGINEERING
VIRGINIA TECH™