

Introduction to

NUCLEAR ENGINEERING



COLLEGE OF ENGINEERING
MECHANICAL ENGINEERING
VIRGINIA TECH.

Degrees

PhD, MS & MENG in Nuclear Engineering

Accelerated MENG in Nuclear Engineering for the US Naval Academy

Certificate in Nuclear Engineering

Certificate in Nuclear Science, Technology and Policy (NuSTEP)
(in collaboration with the STS Department and SPIA)

Campus

Blacksburg

National Capital Region (NCR)

<https://nuclear.ncr.vt.edu>

Program Focus

- Address application of Nuclear Science and Engineering to:

Power, Security, Medicine and Policy

Specific subject areas include:

- Nuclear Materials & Fuel (experimental & theoretical);
- Particle Transport Methods;
- Reactor Physics;
- Reactor Shielding;
- Radiation Detection; and
- Thermal-Hydraulics & Reactor Safety (experimental & modeling)

Core Faculty

Dr. Juliana Duarte
Assistant Prof.



Heat Transfer and
Safety Lab
(HEATS)

Dr. Mark Pierson
Associate Prof. of Practice



Reactor operation,
Radiation detection,
Nuclear Nonproliferation

Dr. Alireza Haghghat
Prof. & Director



Virginia Tech Transport
Theory Group
(VT³G)

Dr. Yang Liu
Assistant Prof.



Multiphase Flow and
Thermal-Hydraulics Lab
(MFTL)

Dr. Celine Hin
Associate Prof.



Theoretical research in
physical metallurgy
Radiation Effects on
Materials

Dr. Jinsuo Zhang
Professor



Nuclear Materials and
Fuel Cycle Center
(NMFC)

Affiliate Faculty

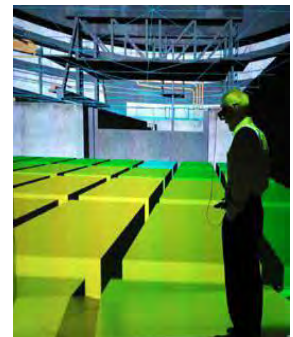
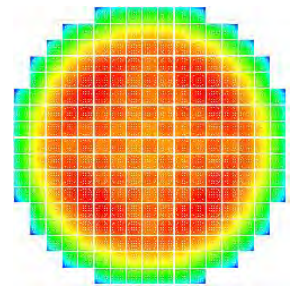
- Dr. Diana Farkas, Prof. of MSE
- Dr. Tomonari Furukawa, Prof. of ME
- Dr. Patrick Huber, Prof. of Physics
- Dr. Jon Link, Prof. of Physics
- Dr. Roop Mahajan, Lewis A. Hester Chair Prof. of ME
- Dr. Camilla Mariani, Associate Prof. of Physics
- Dr. Ranga Pitchumani, George R. Goodson Prof. of ME
- Dr. Patrick Roberts, Associate Prof. of Policy
- Dr. Sonja Schmid, Associate Prof. of STS
- Dr. Danesh Tafti, Willia, S. Cross Prof. of ME
- Dr. Michael Von Spakovsky, Robert E. Hord Prof. of ME

Adjunct Faculty

- Dr. James Turso, Newport News Shipbuilding, Adjunct Associate Prof.
- Dr. Magda Caro, LANL, Adjunct Prof.

Collaborations

- Multiphysics for Advanced Reactor Simulation (MARS) Center – ICTAS
 - Georgia Tech, Penn State, NC State, VT – ME, MSE & Physics
- Center for Neutrino Physics – VT Department Physics
 - Optimization and reduction of background radiation for the CHANDLER Detector system
 - INL, LANL, ORNL, U. Wisconsin, MIT, U. Utah
- Nuclear Fuel Cycle Research
 - INL, Georgia Tech, Oregon State, RPI, MIT, ANL, ORNL
- Nuclear Policy
 - VT School of Public & International Affairs (SPIA); Department of Science, Technology & Society (STS)
- Virtual Reality Systems for Scientific Computing
 - VT Visionarium (Advanced Research Computing)



Collaborations

Virginia Nuclear Energy Consortium Nonprofit Organization

- Prof. Haghighat is the Chairman of Board of this organization
- Members include: Dominion, EnFission, Newport News Shipbuilding, VCU & VT

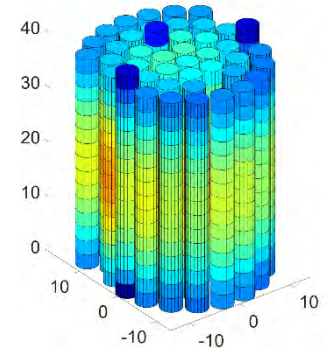
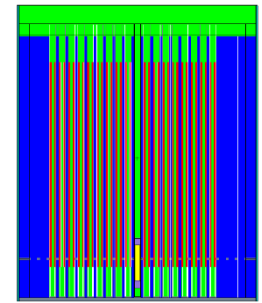
Established Research & Education Agreement with the US Naval Academy (Use of USNA's facilities, research collaborations, MENG degree & Internship)

Nuclear Education Hub – (joint with GWU) funded by DOE, educate Ukrainian Citizens; Establishing MOU's with:

- The University of Maryland's Research Reactor
- The National Institute of Science and Technology (NIST)'s Center for Neutron Research

Forming a MOU with the Jozef Stefan Institute (JSI), Slovenia

- Experimental benchmark of the RAPID code system
- Research collaboration
- Special educational programs (exchange of courses, personnel); operator training
- Organization of computation-experimental short courses



Facilities

- Dedicated high performance computer cluster for parallel computing
- Dedicated Server for VRS-RAPID immersive virtual software
- Visionarium Hypercube Immersive environment
- CHANDLER antineutronic detection system and related laboratories
- Molten Salt Chemistry Loop
- Two-phase Flow Visualization and Measurement Loop
- High-Temperature Water Loops
- Nuclear Materials & Fuel Cycle Lab
- Radiation Measurement Lab
- Access to the USNA nuclear facilities
- Establishing MOUs (with access to research reactors)
 - University of Maryland Research Reactor
 - NIST Center for Neutron Research
 - JSI's TRIGA Research Reactor