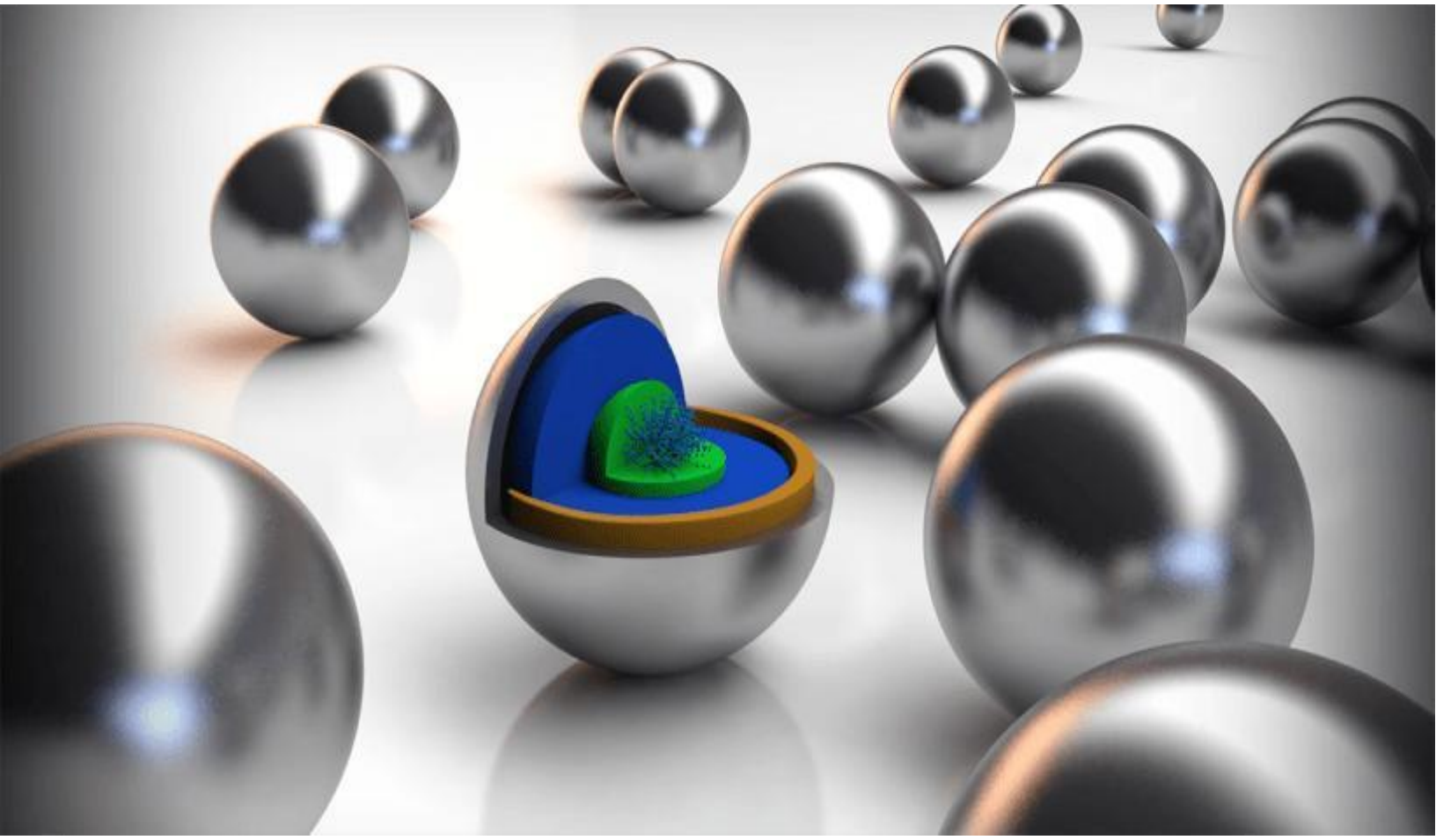
2025
Nuclear Science
and
Engineering Education Sourcebook



U.S. DEPARTMENT OF ENERGY

ANS® American Nuclear Society

Nuclear Science & Engineering Education Sourcebook 2025

North American Edition

American Nuclear Society
Education, Training, and Workforce Division

US Department of Energy
Office of Nuclear Energy

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Note: Cover is a depiction of Triso Nuclear fuel pellets

Version 1.25

Welcome to the 2025 Edition of the Nuclear Science and Engineering Education (NS&EE) Sourcebook. We keep evolving and improving! The core mission of the Sourcebook has not changed, however. Our purpose is to facilitate interaction among faculty, students, industry, and government agencies to accomplish nuclear research, teaching and service activities. Since 1986 we have compiled critical information on nuclear engineering enrollments, degrees, and faculty expertise in printed and electronic formats.

We currently use a web based input format that allows changes to the Sourcebook and the capability to do ranking and sort manipulations in a spreadsheet environment as the data is displayed. We will publish a PDF version of the Sourcebook. We will also include programs that are new and growing, which might include undergraduate curricula with a nuclear energy minor or graduate programs that offer a track or certificate option. We will list only faculty involved in the nuclear options in all of these cases. In general, we list faculty that have at least a budgeted 25% appointment in nuclear activities.

Other nuclear energy or related programs can be found under the listings for the University Reactors. The Sourcebook data will be placed on the web at the Nuclear Energy University Programs (NEUP) site (www.neup.gov) and on the DOE-NE website. The Sourcebook is usually printed on even years. When printed, copies are distributed to academic Department Heads, and libraries, as well as key industry, society and government officials. A limited number of extra printed copies can be requested in cases where web access is limited or inconvenient.

The Sourcebook is a publication by the Education, Training and Workforce Division of the American Nuclear Society with the support of the Department of Energy, Office of Nuclear Energy. Appreciation is expressed to the Executive Committee of the ETWD of the ANS for their encouragement for this project. Special thanks go to the US DOE Office of Nuclear Energy and the NEUP Integration Office at the Idaho National Lab for providing support and a web site home for the NS&EE Sourcebook. We would also like to acknowledge the diligent work of Ms. Beth Fernandez for accumulating the Sourcebook information and for maintenance of the Sourcebook website.

We are excited to present the 2025 Edition of the NS&EE Sourcebook (Version 1.25) available in PDF file format and on the web at www.neup.gov > Documents > Nuclear Science and Engineering Sourcebook.

To update information, please contact Assistant Editor, Ms. Beth Fernandez at bethfernandez@ncsu.edu.

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	7/21-6/22	7/22-6/23	7/23-6/24
Masters	2	2	2
PhD	2	4	1

Number of Graduates

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Nuclear Science and Engineering Research Centers

Radiochemistry Preparation and Analyses Laboratories: Clemson University is licensed by the South Carolina Department of Health and Environmental Control to conduct research with a range of fission/activation products (for example, ^{3}H, ^{57}Co, ^{60}Co, ^{90}Sr, ^{99}Tc, ^{137}Cs), uranium isotopes (^{232}U, ^{233}U, ^{234}U, ^{235}U, and ^{238}U), and transuranics (^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu, ^{241}Am, ^{237}Np, ^{244}Cm, ^{252}Cf). The Environmental Engineering & Earth Sciences department maintainsthree radiochemistry laboratories within the Linvil G. Rich Environmental Laboratory plus six radiochemistry laboratories and two radioecology laboratories in the adjacent Clemson Environmental Technology Laboratory. These include a teaching laboratory, a low-level counting laboratory for environmental samples, three radiation detection and measurement laboratory, multiple radiochemical separation laboratories equipped for working with sealed and unsealed sources. These laboratories total up to approximately 2500 ft^2 of space. Additionally, the laboratories have HEPA filtered anaerobic chambers and glove boxes as needed to perform work in inert atmospheres.

These laboratories contain an array of standard gas and solid-state detectors and pulse processing instrumentation for both routine and specialized applications including:

- Seven High-Purity Germanium Gamma-Ray Spectrometers (one portable)
- One low-energy high-resolution X-ray spectrometer (HPGe, Be window)
- Three NaI(Tl) spectrometers (5" x 5", 3" x 3" and 2" x 2")
- Four alpha/beta discriminating Liquid Scintillation Counters (LSC)
- Perkin Elmer (Wallac) 1220 Quantulus LSC
- Two Perkin Elmer 2910 Alpha Beta Discriminating LSCs
- Flow cell detector (Beta-ram Model 5)
- Eight alpha spectrometers
- One gas-flow proportional counter with automated sample changer
- Miscellaneous gas-filled and scintillation detectors

Analytical instrumentation immediately available for analysis of radionuclides

- Thermo iCAP-RQ inductively coupled plasma mass spectrometer (ICPMS)
- Metrohm Tirando 836 Potentiometric Titration System
- Thermo-Nicolet 6700 FTIR with 1) single bounce diamond ATR, 2) mutlibounce (~11) Ge HATR accessories, and 3) multibounce (~9) diamond integrator ATR.
- TA Instruments TAM III Thermostat with two Isothermal Titration Microcalorimeters
- MILAbs Vector CT (x-ray computed tomography)
- Numerous incubating shaking systems for equilibrating samples at variable temperatures

General Analytical Laboratories: In addition to the radiochemistry laboratories, several dedicated laboratoriesincluding an instrument room, an organic separations laboratory, a biotechnology laboratory, a laminar-flow clean room, and a two-story open-bay laboratory, and numerous general-purpose laboratoriesare located in the facility. Also included are research support areas, including a darkroom, an autoclave and media preparations room, and a gas cylinder storage area. A loading dock for receiving supplies and environmental samples is conveniently located adjacent to the various storage rooms. Some instrumentation that is relevant to the proposed work is listed below:

- Agilent 7890 B GC system with 7000 C triple quadrupole mass spectrometer
- Agilent 1290 Infinity II HPLC with 6470 triple quadrupole mass spectrometer
- Beckman DU640 UV/VIS spectrophotometer
- Cary 300 Bio Spectrophotometer
- Dionex Ion Chromatograph with gradient elution and multiple detectors
- Hewlett-Packard 5890 gas chromatographs with FID and ECD
- Hewlett-Packard 5890 Series II gas chromatograph with 5971A Mass Selective Detector
- Hewlett-Packard 5890 Series II gas chromatograph with FID and NPD
- Hewlett-Packard 6890 gas chromatograph with FID and ECD
- Micrometrics ASAP2010 Surface Area Analyzer
- Perkin Elmer 5100 atomic absorption spectrometer with graphite furnace
- Shimadzu TOC-5050 low-level organic carbon analyzer
- Shimadzu TOC—V CSH low-level organic carbon analyzer
- Thermo Nanodrop 2000 Spectrophotometer
- Thermo FlashEA 1112 Series CHNS/O Analyzer
- Varian 4000 GC-MS/MS
- Waters 840 and Hewlett-Packard 1069 computer-controlled high performance liquid chromatograph with diode array and fluorescence detectors
- Waters 510 liquid chromatograph with UV/Vis detector

For a complete list go to: https://www.clemson.edu/cecas/departments/eees/research/equipment.html

Clemson Electron Microscope Facility is a general user facility that will be fully utilized for examination of surface precipitation and generation of elemental maps of metal distribution across the mineral phases used in this work. There are multiple instruments but a few of note that can be utilized for studies with radioisotopes are:

- Nano-duet Double Beam Scanning Electron / Focused Ion Beam Microscope (NB5000)
- High-resolution Transmission Electron Microscope (H-9500)
- Variable Pressure Scanning Electron Microscope (SU6600)
- Imaging X-ray Photoelectron Spectroscopy (XPS) & AES - PHI 5000 VersaProbe III Scanning XPS & AES Microprobe

Computational Mineralogy and Geochemistry Laboratory is housed in EEES, and currently has four dual monitor workstations. Students use these computers to construct files, analyze data, and connect to the Palmetto Cluster. Palmetto is Clemson University's primary high-performance computing (HPC) resource; heavily utilized by researchers, students, faculty, and staff from a broad range of disciplines.

Currently, Palmetto is comprised of 1786 compute nodes (totaling 34916 CPU cores), and features:

- 639 nodes are equipped with 2x NVIDIA Tesla GPUs, with a total of 1278 GPUs in the cluster; out of these, 34 nodes each have 2x NVIDIA Tesla A100 GPUs
- 3 nodes with Intel Phi co-processors (2 per node)
- 15 large-memory nodes (with 0.75 TB - 1.5 TB of memory); in addition, 604 nodes have at least 128 GB of RAM
- 100 GB of personal space (backed up daily for 42 days) for each user
- 2.2 PB of scratch storage space for computing and a burst-buffer
- 10 and 25 Gbps Ethernet, and 56 and 100 Gbps Infiniband networks
- benchmarked at 3.0 PFlops (44,016 cores from Infiniband part of Palmetto)
- the cluster is 100% battery-backed

Machine Shops: A moderate scale machine shop for fabrication of experimental apparatus. This is accessible free of charge to all departmental faculty. The Clemson College of Engineering, Computing and Applied Sciences also has a full-scale machine shop capable of production of high-quality materials with high precision. This shop is available to all faculty on a per hour fee basis.

COLORADO SCHOOL OF MINES

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	7/21-6/22	7/22-6/23	7/23-6/24
Masters	10	4	9
PhD	1	3	0

Number of Graduates

Graduate Student Enrollment: 19 Masters/ 10 Ph.D.

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Website: https://mechanical.mines.edu/project/deinert-mark/

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Jenifer C. Shafer, Professor (303-273-3996) [jshafer@mines.edu] Ph. D., Washington State University, 2010. Actinide separations; molten salt chemistry; nuclear forensics.
Website: https://chemistry.mines.edu/project/jenifer-shafer/

Nuclear Science and Engineering Research Centers

Nuclear Science and Engineering Center (NuSEC) - Coordinates nuclear science and engineering research across campus and maintains the CSM nuclear science and engineering laboratory facilities located adjacent to the GSTR.

Geological Survey TRIGA Reactor (GSTR) - 1 MW thermal TRIGA reactor used for teaching and research located on the Denver Federal Center, approximately 10 minutes from campus.

Active Materials Characterization Laboratory (ActMCL) - Provides materials synthesis and characterization capabilities for radioactive materials. Located adjacent to the GSTR. Capabilities include scanning electron microscopy, transmission electron microscopy, optical microscopy, x-ray diffraction, and x-ray nano-computed tomography.

Mines Neutron Radiography (MINER) - Provides neutron radiography capabilities at the GSTR. Capabilities include direct and indirect foil imaging capabilities. The facility can provide a beam flux of $2.2X10^6$ n/cm^2– s with an effective L/D of approximately 200.

Laboratory for Applied & Environmental Radiochemistry (LAER) – Located on the Mines Campus, the Laboratory for Applied & Environmental Radiochemistry (LAER) is a multi-user facility well equipped for use and analysis of radioactive materials, especially tranuranic elements. Our emphasis is on understanding the behavior of radionuclides relevant to nuclear energy. Capabilities include all forms of radioactive counting, alpha and gamma spectroscopy, UV-visible spectroscopy calorimetry, biochemistry, chemical synthesis, and all types of chemical separations.

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	15	14	16
Masters	17	21	36
PhD	6	8	5

Number of Graduates

Graduate Student Enrollment: 65 Masters/ 40 Ph.D.
ABET Accreditation: B.S.N.R.E.
CAMPEP Accreditation: M.S.M.P. and Ph.D. NRE – MP option

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Eric S. Elder, Associate Professor of Radiation Oncology and Director of Clinical Medical Physics, Emory University School of Medicine, Adjunct Assistant Professor at Georgia Tech (404-778-2304) [eric@radonc.emory.org] Ph.D., Georgia Institute of Technology, 1997. Certified by the American Board of Radiology – Therapeutic Radiologic Physics 1997; image-guided radiation therapy (IGRT) methods; endovascular brachytherapy.

Styliani Flampouri, Adjunct Associate Professor, Associate Professor in Department of Radiation Oncology, Emory University School of Medicine, Ph.D. Institute of Cancer Research & Royal Marsden Hospital, proton radiation dose uncertainties and investigation of techniques to mitigate the effects; and the methodology for lung and lymphoma proton treatment planning and delivery.

Timothy Fox, Vice President, Varian Medical Systems, Adjunct Assistant Professor at Georgia Tech (770- 372-1410) [tim.fox@varian.com] Ph.D., Georgia Institute of Technology, 1994. Medical imaging; radiation treatment planning; oncology data analytics.

Srinivas Garimella, Professor (404-894-7479) [srinivas.garimella@me.gatech.edu] Ph.D., The Ohio State University, 1990. Heat transfer; thermal-hydraulics; microchannel phase change.

S. Mostafa Ghiaasiaan, Professor (404-894-3246) [mghiaasiaan@gatech.edu] Ph.D.**,** University of California, Los Angeles**,** 1983. Heat transfer; two-phase flow; nuclear reactor engineering. Professional Engineer.

Sheela Hanasoge, Adjunct Assistant Professor, Assistant Professor Emory University School of Medicine, M.D. Seth G.S. Medical College, Ph.D. University of Michigan, radiation oncology, treatment of breast, head and neck, gynecological and genitourinary cancers.

H. M. Hashemian, Adjunct Professor of Practice (865-691-1756) [hash@ams-corp.com] PhD NE Chalmers University of Technology – Sweden 2010, PhD CE Western University – Canada 2011, DEng EE Lamar University – Texas 2009. Specialized in nuclear power plant Instrumentation and Control.

Nolan E. Hertel, Emeritus Professor (404-894-3601) [nolan.hertel@nre.gatech.edu] Ph.D., University of Illinois at Urbana-Champaign, 1979. Radiation spectrometry; transport; dosimetry and shielding; radiation detector simulations and design; neutron measurements and applications; computational dosimetry; radiation protection. Professional Engineer.

Tom C.-C. Hu, Project Officer, The Biomedical Advanced Research and Development Authority (BARDA), within the Office of the Assistant Secretary for Preparedness and Response (ASPR) in the U.S. Department of Health and Human Services (HHS) [tom.hu@hhs.gov] Part-Time Assistant Professor of Radiology and Founding Director of Small Animal Imaging Program, Medical College of Georgia; [thu@mail.mcg.edu]; Adjunct Assistant Professor at Georgia Tech; Ph.D.**,** Carnegie Mellon University**,** 2001; MBA, Villanova University, 2005. Non-invasive magnetic resonance imaging (MRI) in small animals.

Chulhaeng Huh, Associate Professor and Director of Medical Physics in the Radiation Oncology Department & Director of Medical Physics Residency Program, Augusta University, Adjunct Associate Professor at Georgia Tech (706-446-5347) [chuh@augusta.edu], Ph.D., University of Florida, 2003. Certified by the American Board of Radiology – Therapeutic Medical Physics. Magnetic Induced Hyperthermia and combined therapy with radiation, Image-guided radiation therapy (IGRT) & Brachytherapy.

Andrew Hummel, Lecturer [ahummel6@gatech.edu] Ph.D., Oregon State University, 2014. Reactor physics; core modeling & simulation; course instruction and development.

Laurence J. Jacobs, Professor (404 -894-2344) [laurence.jacobs@coe.gatech.edu] Ph. D, Columbia University, 1987. Development of measurement techniques for the quantitative nondestructive evaluation of structural materials; nonlinear acoustics for damage characterization and life prediction of structural materials.

Benjamin Klein, Professor (912-966-7945) [bklein@gatech.edu] Ph.D.**,** University of Illinois at Urbana-Champaign, 2000. Reactor physics; transport theory; optical; optoelectronic; and electronic device simulation and design; wide-bandgap semiconductors; nanowire FETs and LEDs; scintillator characterization and design; photonic crystal devices.

Margaret E. Kosal, Associate Professor (404-894-9664)[margaret.kosal@inta.gatech.edu] Ph.D., University of Illinois at Urbana-Champaign, 2001. Nuclear, chemical, and biological nonproliferation; counterproliferation; counterterrorism; and consequence management; CBRN defensive countermeasures and policy; deterrence; emerging technologies (nanotechnology, including metamaterials; biotechnology, including synthetic genomics; neuro- and cognitive sciences) and international security.

Choonsik Lee, Adjunct Professor; Medical Physicist, Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health (240-381-5474) [choonsik.lee@nih.gov] Ph.D., Hanyang University, 2002; medical radiation dosimetry; computational human phantoms; Monte Carlo radiation transport

Jolinta Lin, Assistant Professor in Department of Radiation Oncology at Emory University, Adjunct Assistant Professor at Georgia Institute of Technology, M.D., University of Maryland School of Medicine, understanding mechanisms of toxicity from radiation therapy, identifying potential pathways to decrease side effects, and improving patients' quality-of-life issues.

Liyong Lin, Adjunct Professor (404-251-2848) [llin30@emory.edu] Ph.D., FAAPM, DABR, University of Wisconsin-Madison, 2006. Proton Therapy: Monte Carlo Treatment Planning, Simulation, Commissioning and Quality Assurance; FLASH and LET optimization and delivery; Detection technique and data Processing; Proton imaging include AI processing; Clinical trial design.

Farshad Mostafaei, Assistant Professor and Director of Research in the Radiation Oncology Department & Associate Director of Medical Physics Residency Program, Augusta University, Adjunct Assistant Professor at Georgia Tech (706-446-5345) [fmostafaei3@gatech.edu], Ph.D., McMaster University, 2015. Certified by the American Board of Radiology – Therapeutic Medical Physics. Dosimetry, Motion Management, Ultrasound, Image-guided radiation therapy (IGRT) & Brachytherapy.

Jonathon A. Nye, Assistant Professor of Radiology, Emory University School of Medicine (404-778-4227) [jnye@emory.edu] Ph.D., University of Wisconsin – Madison, 2005. Nuclear Medical Physics; Radioisotope production; Positron emission tomography; Kinetic Modeling.

Pretash Patel, Assistant Professor of Radiation Oncology, Emory University School of Medicine; Adjunct Assistant Professor at Georgia Tech (404-778-3473) [pretesh.patel@emory.edu] M.D., Duke University, 2008. HDR brachytherapy in gynecological and genitourinary malignancies; advancements in clinical and technical aspects of SBRT; use of information technology to improve quality and safety in oncology clinical practice.

Justin Roper, Medical Physicist, Hospital Corporation of America, Adjunct Assistant Professor at Georgia Tech (404-894-1044) [justin.roper@emory.edu] Ph.D., Duke University, 2010. Certified by the American Board of Radiology - Therapeutic Medical Physics 2013; image guided radiation therapy, functional and molecular imaging as a means to design treatments based on the biology of cancer and normal tissue.

Lawrence P. Rubin, Associate Professor (404-385-4081) (lawrence.rubin@inta.gatech.edu)
Ph.D., University of California, Los Angeles, 2009. Nuclear nonproliferation; terrorism; energy security; and Middle East politics and security.

Joseph Shelton, Assistant Professor Department of Radiation Oncology at Emory University, Adjunct Assistant Professor at Georgia Institute of Technology, M.D., University of North Carolina. The treatment and outcomes of patients with gynecologic and genitourinary malignancies. Current work focuses on the development of new treatment strategies combining modern radiotherapy and chemotherapy in post-cystectomy bladder cancer patients. Other work involves investigating strategies for adapting brachytherapy and external beam radiation treatments to improve outcomes in cervical cancer patients.

Weston M. Stacey, Jr., Emeritus Professor (404-894-3714) [weston.stacey@nre.gatech.edu] Ph.D.**,** Massachusetts Institute of Technology 1966. Fusion plasma physics; reactor physics and conceptual design for fusion and fission reactors.

Adam N. Stulberg, Professor and Co-Director of the Center for International Strategy, Technology, and Policy (404-385-0090) [adam.stulberg@inta.gatech.edu] Ph.D., University of California, Los Angeles, 1996. Nuclear strategy; arms control; and nonproliferation; internationalization of the fuel cycle; illicit nuclear trafficking; nanotechnology and international security.

Kyle H. Turner, Chief Executive Officer, McCallum-Turner, Inc., Adjunct Professor at Georgia Tech (303- 670-8797) [turner@mccallumturner.com] Ph.D., Georgia Institute of Technology, 1972. Conduct of operations; nuclear safety management, nuclear enterprise management.

William J. Wepfer, Professor Emeritus (404-894-3200) [bill.wepfer@me.gatech.edu] Ph.D., University of Wisconsin-Madison, 1979. Heat transfer; energy systems; and fuel cells.

Rachel Whitlark, Associate Professor, [rachel.whitlark@inta.gatech.edu] Ph.D. George Washington University 2014, International security, international relations, foreign-policy decision-making, nuclear weapons and proliferation, military intervention, U.S. foreign and national security policy, grand strategy, defense policy, qualitative methods.

Xiaofeng Yang, Assistant Professor in Department of Radiation Oncology at Emory University, Director of Medical Physics Residency Program, Adjunct Assistant Professor at Georgia Institute of Technology, Ph.D. Xi'an Jiaotong University, 2006. Medical imaging, image-guided radiotherapy, machine learning, medical image analysis, and prostate cancer.

Shannon Yee, Assistant Professor [shannon.yee@me.gatech.edu] Ph.D., University of California Berkeley, 2013. Heat transfer, energy systems, direct energy conversion, thermoelectrics, and thermal energy conversion.

Dingkang Zhang, Research Engineer II (404-894-2087) [dingkang.zhang@me.gatech.edu] Ph.D., Georgia Institute of Technology, 2005. Computational radiation transport theory; computational reactor physics; medical physics. Website: http://nremp.gatech.edu/faculty/dzhan

Jun Zhou, Adjunct Assistant Professor, Associate Professor Emory School of Medicine, Ph.D., Tsinghua University, proton treatment planning, proton stereotactic body radiotherapy (SBRT), proton arc therapy, proton imaging and image-guided adaptive radiotherapy.

Ting Zhu, Professor (404-894-6597) [ting.zhu@me.gatech.edu] Ph.D., Massachusetts Institute of Technology**,** 2004. Mechanical behavior of solids and thin films; nanomechanics of defect incrystals; coupled mechano-chemical phenomena; multiscale and nuclear energy related materials modeling.

Nuclear Science and Engineering Research Centers

Fusion Research Center: [www.frc.gatech.edu], Director, Weston Stacey (NRE), [weston.stacey@nre.gatech.edu] (404-894-3714). Plasma edge physics, plasma and neutral particle transport, fusion neutron source applications, next-step tokamak design analysis, transmutation of spent nuclear fuel.

Radiological Science and Engineering Laboratory: [www.rsel.gatech.edu] (404-894-3606) The RSEL provide a wide variety of nuclear and accelerator-driven research and irradiation services to the needs of faculty, staff and external customers. Facilities in the RSEL include: Varian Clinical Linear Accelerator (VCLA) laboratory, A Neutron Reference Field Laboratory, A Neutron Generator Irradiation Facility, A Gamma Calibration Laboratory, and Sub-critical Graphite and Natural Uranium Pile, as well as various radiological support instruments.

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	14	14	14
Masters	6	5	6
PhD	1	2	2

Number of Graduates

Graduate Student Enrollment: 35 Masters/ 9 Ph.D.
ABET Accreditation: B.S. in Nuclear Engineering, B.S. in Health Physics, & MS in Health Physics

Nuclear Science and Engineering Faculty

Chad L. Pope, Professor and Department Chair (208-282-2875) [popechad@isu.edu] Ph.D., Idaho State University, 2011. Nuclear Safety.

Amir Ali, Associate Professor (208-553-8113) [aliamir@isu.edu] Ph.D., University of New Mexico, 2013. Thermal-hydraulics.

Richard Brey, Professor and Health Physics Program Director (208-282-2667) [breyrich@isu.edu] Ph.D., Purdue University. 1994. Health Physics.

Mary Lou Dunzik-Gougar, Professor and Associate Dean (208-533-8111) [mldg@isu.edu] Ph.D., Pennsylvania State University**,** 2003. Nuclear Fuel Cycle.

Daniel LaBrier, Associate Professor (208-533-8165) [labrdani@isu.edu] Ph.D., Idaho State University, 2013. Nuclear Materials.

Other Faculty

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Kermit Bunde, Adjunct Faculty [kermitbunde@isu.edu] MS, Idaho State University, Monte Carlo.

Michael Calley, Adjunct Faculty [michaelcalley@isu.edu] MS, Idaho State University, risk analysis.

Roy Dunker, EML Supervisor **(**208-282-4368) **[**dunkroy@isu.edu] MS in Health Physics**,** Idaho State University**,** 1998**.** Radionuclide metrology and low-level radionuclide measurements of the environment.

Thomas Gesell, Emeritus Professor (208-282-3669) [gessthom@isu.edu] Ph.D. Health physics, environmental radioactivity.

George R. Imel, Emeritus (208-705-2344) [gimel@isu.edu] Ph. D.**,** Pennsylvania State University**,** 1971. Reactor Physics.

Jay F. Kunze, Emeritus and Reactor Administrator (208-282-4147) [kunzejay@isu.edu] Ph.D.**,** Carnegie-Mellon**,** 1959. Reactor engineering, reactor physics, health physics, medical physics. Professional Engineer.

Emerald Ryan, Adjunct Faculty [emeraldryan@isu.edu] PhD, Idaho State University, reactor physics.

Richard Schultz, Adjunct Research Professor (208-521-5605) [srr@srv.net] Ph.D. Idaho State University, 2010. Idaho National Laboratory Thermal hydraulics experimentation, instrumentation, and analysis. Reactor safety analysis. Professional Engineer.

Ryan Stewart, Adjunct Faculty [ryanstewart@isu.edu] PhD, Oregon State University, reactor physics.

Nuclear Science and Engineering Research Centers

AGN-201M, 5 W Reactor Laboratory: Administrator: Mary Lou Dunzik-Gougar Ph.D. (208-533-8111) [mldg@isu.edu] Lillibridge Engineering Laboratory, Pocatello, ID 83209-8060. Used for training and research.

Environmental Assessment and Monitoring Laboratory: Director, Richard Brey, Ph.D.(208-282-4539) [breyrich@isu.edu] Low level radiation monitoring, instrument calibration, trace element analysis. High range dosimetry support for the Idaho Accelerator Center.

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	10	16	8
Masters	1	3	4
PhD	5	2	4

Number of Graduates

Graduate Student Enrollment: 8 Masters/ 12 Ph.D.
ABET Accreditation: Bachelor of Science (BS) Degree in Mechanical Engineering

Nuclear Science and Engineering Faculty

Amir Bahadori, Associate Professor (785-532-7040) [bahadori@ksu.edu] Ph.D., University of Florida, 2012. Characterization of radiation environments; response of humans to radiation exposure. Website: http://www.mne.k-state.edu/people/faculty/bahadori/

Arsen Iskhakov, Assistant Professor (785-532-5610), Ph.D., North Carolina State University, 2022. Strategies to Enhance Simulation & Experimentation in Nuclear Engineering.

Douglas S McGregor, Professor (785-532-5610) [mcgregor@ksu.edu] Ph.D., University of Michigan, 1993. Development of room temperature gamma ray spectrometers; semiconductor radiation detectors; solid-state neutron detectors; miniaturized neutron detectors; scintillator crystal growth; compound semiconductor crystal growth; radiation detector arrays.
Website: http://www.mne.ksu.edu/people/faculty/mcgregor

Walter McNeil, Associate Professor (785-532-5610) [wmcneil@ksu.edu] Ph.D., Kansas State University, 2010. Radiation detection systems design; gamma-ray imaging; radiation background monitoring.

Jeremy Roberts, Associate Professor (785-532-5610) [jaroberts@ksu.edu] Ph.D., Massachusetts Institute of Technology, 2014. Computational nuclear engineering; reactor physics; neutron transport (both deterministic and stochastic); optimization, sensitivity and uncertainty analysis. Website:
http://www.mne.ksu.edu/people/faculty/roberts

Nuclear Science and Engineering Research Centers

SMART Lab: The Semiconductor Materials and Radiological Technologies (S.M.A.R.T.) Laboratory at Kansas State University is a unique facility dedicated to the research and development of new and innovative radiation detector technologies. A variety of detectors are investigated and fabricated, which include compact low-power neutron detectors, high-resolution room-temperature-operated semiconductor gamma ray spectrometers, pixelated devices for gamma ray or neutron imaging, and miniaturized gas-filled detectors.

Radiological Engineering Analysis Laboratory: Research involving radiation transport and dosimetry with a focus on radiation protection and imaging applications. |Substantial computational resources, including dedicated nodes on the KSU high performance computing system Beocat; several radiation software/code packages, including COMSOL Multiphysics, HZETRN-2015, Geant4, PHITS, and MCNP; a 3D printer used for rapid prototyping; a hand-held 3D scanner; a RadSource RS 1800 irradiator for x-ray experiments; several pieces of equipment enabling passive radiation dosimetry, including a Harshaw 5500 TLD reader; Timepix-based pixel detectors with semiconductor radiation sensors

Triga Mark II Nuclear Reactor Facility: The Kansas State University TRIGA Mark II nuclear reactor facility supports academic and education programs, research, industrial service and outreach. Students in the MNE nuclear option utilize the reactor in two reactor operation laboratory classes, and as a neutron and gamma source for a radiation-detection course. The reactor is licensed to operate at up to 1.25 MW. Its research capabilities include a variety of neutron beams for detector testing, internal imaging using neutron radiography and tomography, tracer isotope production, and trace element analysis via neutron activation analysis. The facility is staffed almost entirely by licensed undergraduate student operators, providing both an excellent opportunity for the students and supporting the manpower needs of the local nuclear power industry.

Radiological Systems Integration Lab: The Radiological Systems Integration Lab (RSIL) develops radiation sensing systems and mechanical and electronic technology. We develop innovative sensing instrumentation that can be used in remote and rugged environments. We also focus on the miniaturization and portability of the equipment, which is critical for military, domestic security, and human health monitoring.

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	5	9	10
Masters	10	16	28
PhD	24	13	14

Number of Graduates

Graduate Student Enrollment: 25 Masters/ 114 Ph.D.
ABET Accreditation: SB

Nuclear Science and Engineering Faculty

Benoit Forget, KEPCO Professor of Nuclear Engineering and Department Head of Nuclear Science and Engineering (617-253- 1655) [bforget@mit.edu] Ph.D., Georgia Institute of Technology, 2006. Computational transport theory; Reactor Physics and Nuclear Fuel Cycle.
Website: http://web.mit.edu/nse/people/faculty/forget.html

Emilio Baglietto, Norman C Rasmussen Professor of Nuclear Science and Engineering, and Associate Department Head of Nuclear Science and Engineering (617-253-4231) [emiliob@mit.edu] Ph.D., Tokyo Institute of Technology, 2004. Turbulence modeling; Unsteady flow phenomena; multiphase flow and boiling; virtual reactor modeling. Website: http://web.mit.edu/nse/people/faculty/baglietto.html

Matteo Bucci, Esther and Harold E. Edgerton Associate Professor and Professor of Nuclear Science and Engineering (617-253-2336) [mbucci@mit.edu] Ph.D., University of Pisa, Italy, 2009. Multi-phase flow and heat transfer; Reactor thermal-hydraulics; Nanotechnologies for advanced heat transfer; Integration of sensors, simulations and machine learning tools. Website: http://bucci.mit.edu

Jacopo Buongiorno, Battelle Energy Alliance Professor of Nuclear Science and Engineering; Professor of Mechanical Engineering; Member for the US National Academy of Engineering (617-253-7316) [jacopo@mit.edu] Ph.D., Massachusetts Institute of Technology, 2000. Multi-phase flow and heat transfer; innovations in nuclear fission technology; nuclear economics and policy; advanced reactor design; reactor thermal hydraulic. Website: http://web.mit.edu/nse/people/faculty/buongiorno.html

Paola Cappellaro, Ford Professor of Engineering, Professor of Nuclear Science and Engineering and Professor of Physics (617-253-8137) [pcappell@mit.edu] Ph.D., Massachusetts Institute of Technology. Quantum control; quantum information; precision measurement; nuclear magnetic resonance. Website: http://web.mit.edu/nse/people/faculty/cappellaro.html

Areg Danagoulian, Associate Professor of Nuclear Science and Engineering (617-324-6329) [aregjan@mit.edu] Ph.D., University of Illinois at Urbana-Champaign, 2006. Nuclear security; arms control; non-proliferation; nuclear safeguards. Website: lanph.mit.edu/areg

Jack Hare, Gale Career Development (1929) Assistant Professor of Nuclear Science and Engineering (617-715-3384) [jdhare@mit.edu] Ph.D., Imperial College London, 2017. Pulsed-power-driven plasma physics experiments on magnetic reconnection, magnetized turbulence, and shocks. Website: https://web.mit.edu/nse/people/faculty/hare.html

Zachary Hartwig, Associate Professor of Nuclear Science and Engineering (617-253-5471) [hartwig@mit.edu] Ph.D., Massachusetts Institute of Technology, 2013. Head of the PSFC Engineering Group. Superconducting magnet engineering; Radiation damage in materials; Radiation detection; Ion accelerators. Website: https://web.mit.edu/nse/people/faculty/hartwig.html

Alan Pradip Jasanoff, Professor of Biological Engineering and Professor of Nuclear Science and Engineering (617-452-2538) [jasanoff@mit.edu] Ph.D., Harvard University. Functional Magnetic Resonance Imaging (MRI); molecular neuroimaging; behavioral and systems neuroscience. Website: http://web.mit.edu/jasanofflab/

Ericmoore Jossou, John Clark Hardwick (1986) Assistant Professor of Nuclear Science and Engineering and Assistant Professor of Electrical Engineering and Computer Science (617-253-3810) [ejossou@mit.edu] Ph.D., University of Saskatchewan, 2019. Radiation damage in nuclear materials; X-ray scattering and imaging methods; Nuclear fuels. Website: https://web.mit.edu/nse/people/faculty/jossou.html

R. Scott Kemp, Associate Professor of Nuclear Science and Engineering (617-324-3308) [rsk@mit.edu] Ph.D., Princeton University, 2010. National security, nonproliferation, and arms control policy; verification techniques; energy policy and climate change. Website: http://lnsp.mit.edu/r-scott-kemp

Richard S Lester, Vice Provost for International Activities; Japan Steel Industry Professor; Professor of Nuclear Science and Engineering; Faculty Chair, Industrial Performance Center (617-253-7704) [rklester@mit.edu] Ph.D., Massachusetts Institute of Technology, 1979. Innovation strategy and management; nuclear technology management and control; energy/climate innovation policy. Website: http://web.mit.edu/nse/lester/index.html

Ju Li, TEPCO Professor of Nuclear Science and Engineering and Professor of Materials Science (617-253-0166) [liju@mit.edu] Ph.D., Massachusetts Institute of Technology, 2000. Overcoming timescale challenges in atomistic simulations; energy storage and conversion; materials in extreme environments and far from equilibrium. Website: http://web.mit.edu/nse/people/faculty/li.html

Mingda Li, Class of 1947 Development Professor and Associate Professor of Nuclear Science and Engineering (617-452-2505) [mingda@mit.edu] Ph.D., Massachusetts Institute of Technology, 2015. Neutron and X-ray scattering. Topological materials. Machine learning. Website: http://qm.mit.edu

Nuno F. G. Loureiro, Professor of Nuclear Science and Engineering and Herman Feshbach (1942) Professor of Physics, Director of the Plasma Science and Fusion Center (617-253-9741) [nflour@mit.edu] Ph.D., Imperial College, 2005. Theory and computational modeling of plasma physics and controlled fusion. Website: http://web.mit.edu/nse/people/faculty/loureiro.html

Ethan Peterson, Class of 1956 Career Development Professor, Assistant Professor of Nuclear Science and Engineering [peterson@psfc.mit.edu] Ph.D., University of Wisconsin—Madison, 2019. Fusion reactor design and analysis; radiation transport methods; fusion neutronics validation; uncertainty quantification. Website: https://web.mit.edu/nse/people/faculty/peterson.html

Koroush Shirvan, Atlantic Richfield Chair Development Professor, Associate Professor of Nuclear Science and Engineering (617-452-3017) [kshirvan@mit.edu] Ph.D., Massachusetts Institute of Technology, 2012. Nuclear reactor design; Nuclear fuel performance; Reactor safety; Advanced energy systems. Website: http://web.mit.edu/nse/people/faculty/shirvan.html

Michael Short, Associate Professor of Nuclear Science and Engineering (617-324-6329) [hereiam@mit.edu] Ph.D., Massachusetts Institute of Technology, 2010. Mesoscale nuclear materials, corrosion and foulding; radiation damage quantification. Website: http://web.mit.edu/nse/people/faculty/short.html

Curtis L. Smith, KEPCO Professor of the Practice of Nuclear Science and Engineering (208-201- 9110), Ph.D. Massachusetts Institute of Technology, Cambridge, 2002. Applied engineering applications within the nuclear & aerospace industries, risk-informed decision making, nuclear systems analysis, probabilistic risk analysis. Website: https://web.mit.edu/nse/people/faculty/csmith.html

Haruko Murakami Wainwright, Mitsui Career Development Professor in Contemporary Technology, Assistant Professor of Nuclear Science and Engineering, and Assistant Professor of Civil and Environmental Engineering [hmwainw@mit.edu], PhD University of California, Berkeley, 2010, Nuclear waste and contamination; environmental monitoring; computational groundwater hydrology; environmental informatics. Website: https://sites.google.com/mit.edu/h-wainwrights-group/home

Anne E. White, Professor of Nuclear Science and Engineering, MIT School of Engineering Distinguished Professor of Engineering, Associate Vice President for Research Administration (617-253-8667) [whitea@psfc.mit.edu] Ph.D., University of California, Los Angeles, 2008. Plasma physics, turbulence and turbulence-driven transport, fluctuation diagnostics for magnetic confinement fusion experiments. Website: http://web.mit.edu/nse/people/faculty/white.html

Dennis G. Whyte, Hitachi America Professor of Engineering, Professor of Nuclear Science and Engineering (617-253-1748) [whyte@psfc.mit.edu] Ph.D., Université du Quebec, 1992. Plasma-surface interactions physics and diagnostics for magnetic fusion energy; accelerator-based simulation of plasma-surface interaction in fusion reactors. Website: http://web.mit.edu/nse/people/faculty/whyte.html

Bilge Yildiz, Professor of Nuclear Science and Engineering and Professor of Materials Science and Engineering (617-324-4009) [byildiz@mit.edu] Ph.D., Massachusetts Institute of Technology, 2002. Electrochemical materials and interfaces; electrochemical energy conversion by fuel cells, electrolyzers, membranes; corrosion and hydrogen resistant films in extreme environments; electrochemical energy storage by solid state batteries; neuromorphic computing materials; redox based memristive information storage and processing; cation based memristive information storage and processing; ceramics; surface science; computational materials science; synchrotron and scanning probe experiments.
Website: http://web.mit.edu/nse/people/faculty/yildiz.html

Other Faculty

Ronald G. Ballinger, Emeritus Professor of Nuclear Science and Engineering and Materials Science and Engineering (617-253-5118) [hvymet@mit.edu] Sc.D., Massachusetts Institute of Technology, 1982. Corrosion and fatigue. Fuel behavior modeling, environmental effects on materials performance.
Website: http://web.mit.edu/nse/people/faculty/ballinger.html

Peter Catto, Senior Research Scientist (617-253-5825) [catto@psfc.mit.edu] Ph.D. Plasma and neutral flows; electric fields, and edge physics issues in diverted tokamak plasmas, and dipole stability.
Website: http://www.psfc.mit.edu/people_new/faculty/catto.html

Charles W. Forsberg, Principal Research Scientist; Executive Director, MIT Nuclear Fuel Cycle Project (617-324-4010) [cforsber@mit.edu] Sc.D., Massachusetts Institute of Technology, 1974. Development of integrated nuclear fuel cycles, fluoride-salt-cooled high-temperature reactors, and development of global nuclear-renewables energy systems (100-GWh heat storage and cellulosic hydrocarbon biofuels).
Website: http://web.mit.edu/nse/people/faculty/forsberg.html

Jeffrey P. Freidberg, Professor Emeritus of Nuclear Science and Engineering (617-253-8670) [jpfreid@mit.edu] Ph.D., Polytechnic Institute of Brooklyn, 1964. Plasma Physics; Fusion Technology.
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Michael W. Golay, Professor Emeritus of Nuclear Science and Engineering (617-253-5824) [golay@mit.edu] Ph.D., Cornell University, 1969. Nuclear power innovation, risk and regulation, non-proliferation. Founder of MIT-INPO reactor technology course.
Website: http://web.mit.edu/nse/people/faculty/golay.html

Linn W. Hobbs, Professor Emeritus of Nuclear Science and Engineering and Materials Science and Engineering Emeritus (617-253-6835) [hobbs@mit.edu] D.Phil., Oxford University, UK 1972. Radiation effects in materials (principally ceramics, but also metals and organics); extended defects and non - stoichiometry in nonmetalic solids; atomistic and topological modeling of glass structures; high - temperature corrosion; orthopaedic biomaterials and biomineralization.
Website: http://web.mit.edu/hobbsgroup/

Ian H. Hutchinson, Professor Emeritus of Nuclear Science and Engineering (617-253-8670) [ihutch@mit.edu] Ph.D., Australian National University, 1976. Plasma physics and controlled fusion. Website: http://web.mit.edu/nse/people/faculty/hutchinson.html

Richard C. Lanza, Senior Research Scientist (617-253-2399) Ph.D. Radiation imaging; radiation detectors; nondestructive testing; radiological and industrial applications of radiation; development of new radiation sources; application of formal risk analysis to nuclear arms negotiations.

Ronald R. Parker, Professor Emeritus of Nuclear Science and Engineering and Electrical Engineering and Computer Science (617-258-6662) [parker@mit.edu] Sc.D., Massachusetts Institute of Technology, 1967. Plasma physics and controlled thermonuclear fusion.

Kord Smith, Professor of the Practice Emeritus of Nuclear Science and Engineering (208-757-8103) [kord@mit.edu] Ph.D., Massachusetts Institute of Technology, 1980. Reactor analysis methods; computational methods; high performance computing (HPC)s.
Website: http://web.mit.edu/nse/people/faculty/smith.html

Neil E. Todreas, Professor Emeritus of Nuclear Science and Engineering and Professor Emeritus of Mechanical Engineering (617-253-5296) [todreas@mit.edu] Sc.D. Reactor engineering; reactor thermal analysis; heat transfer and fluid flow.

Sidney Yip, Professor Emeritus of Nuclear Science and Engineering and Professor Emeritus of Materials Science and Engineering (805-563-1730) [syip@mit.edu] Ph.D., University of Michigan, 1962. Computational materials science, multiscale molecular simulations.
Website: http://web.mit.edu/nse/people/faculty/yip.html

Nuclear Engineering Research Centers

Center for Advanced Nuclear Energy Systems (CANES)
[http://energy.mit.edu/reserach/future-nuclear-energy-carbon-constrained-world/]
Director, Professor Jacopo Buongiorno (NSE). CANES has four research themes: Near-term Innovations in Fission Systems, Inventing the Future of Fission, Working at the Foundations of Nuclear Energy Technology, and Educating the Community/Informing the Policy. Ongoing projects cover the full spectrum of fission energy technology and policy from Advanced Reactors to Nuclear Fuel Cycles, from Enhanced Plant Performance to Nuclear Energy and Sustainability. The Center offers three short summer professional courses: Nuclear Systems Safety, Nuclear Energy: Key Facts and Issues, Reactor Technology for Power Plan Executives, and Probabilistic Methods for Nuclear Plant Management. Annual Research Expenditure: >$10M. The Center has recently completed the seminal study of the Future of Nuclear Energy in a Carbon-Constrained World.

Plasma Science and Fusion Center [http://psfc.mit.edu/] Director, Professor Dennis Whyte (NSE) [whyte@psfc.mit.edu]. The Plasma Science and Fusion Center carries out a broad range of experimental and theoretical research in understanding the physics of plasmas and their applications to magnetic and inertial confinement fusion, the physics of waves and beams, development of state-of-the-art superconducting magnet systems, and development of plasma technologies for industry applications. The Center's Magnetic Resonance Division is internationally recognized for advances in Magnetic Resonance Imaging (MRI) and Nuclear Magnetic Resonance (NMR) Spectroscopy, in NMR and MRI magnet development, and in nanoscience condensed matter physics.

Industrial Performance Center (IPC) [http://web.mit.edu/ipc] Faculty Director, Richard K. Lester (Japan Steel Industry Professor of Nuclear Science and Engineering); Executive Director, Elisabeth B. Reynolds (Principal Research Scientist and Lecturer, DUSP). The Industrial Performance Center (IPC) is an MIT-wide research unit, based in the School of Engineering. The Center serves as a focus at MIT for interdisciplinary research on the rapidly changing global economy. Our interdisciplinary teams observe, analyze and report on strategic, technological, and organizational developments in a broad range of industries and examine the implications for society and the global economy. The IPC currently has four main research areas: innovation; production; energy and globalization. It currently leads the Institute-wide Task Force on the Work of the Future.

MIT Nuclear Reactor Laboratory (6 MW reactor) [http://nrl.mit.edu/] Directors, Dr. Gordon Kohse, Prof. Jacopo Buongiorno, Dr. Lance Snead . The MIT NRL is an interdepartmental center that operates a high-performance 6 MW nuclear research reactor known as the MIT Reactor (MITR), which is a partner of the Department of Energy's National Science User Facilities. The MITR is a light-water cooled and moderated, heavy-water reflected, reactor that utilizes flat, finned, aluminum-clad, plate-type, fuel elements. The average core power density is about 70 kW per liter. The maximum fast and thermal neutron flux available to experimenters are 1.2×10^{14} and 6×10^{13} neutrons/cm^2-s, respectively. Experimental facilities available at the MITR include two medical irradiation rooms, beam ports, automatic transfer facilities (pneumatic tubes), and graphite-reflector irradiation facilities. In addition, several types of in-core experimental facilities are available, e.g., a pressurized-water loop capable of reproducing the temperature, pressure, flow, neutron flux and water chemistry conditions of a commercial power reactor. Focus is on advanced materials, fuel and instrumentation irradiation tests, reactor physics modeling, neutron beam applications, and neutron activation analysis. New methods are under development to enable advanced x-ray and neutron imaging of irradiated nuclear materials. The MITR is also used to support lab courses, irradiation services, student operator training and public outreach activities.

Nuclear Science and Engineering Research Laboratories

Center for Science and Technology with Accelerators and Radiation (CSTAR)
[https://cstar.mit.edu/home.php] CSTAR is dedicated to advancing nuclear science and engineering through the development and application of particular accelerators, particle detectors, and linear plasma devices.

Concrete Sustainability Hub [http://cshub.mit.edu/] The MIT Concrete Sustainability Hub, CSHub, is a dedicated interdisciplinary team of researchers from several departments across MIT working on concrete and infrastructure science, engineering, and economics since 2009. The MIT CSHub brings together leaders from academia, industry, and government to develop breakthroughs using a holistic approach that will achieve durable and sustainable homes, buildings, and infrastructure in ever more demanding environments.

H.H.Uhlig Corrosion Laboratory [http://uhliglab.scripts.mit.edu/] The H. H. Uhlig Corrosion Lab investigates the causes of failure in materials and the prevention of failure in materials, with an emphasis on nuclear materials.

Computational Fluid Dynamics Research Group [https://baglietto.mit.edu/] The CFD group in NSE focuses on the advancement of single and multiphase closure models thatincorporate novel physical understanding that more generally represent the complex anisotropic nature of the mass, momentum and heat flux processes. The objective is to deliver advances in computational fluid flows and heat transfer simulations, which will benefit the operation and safety of the current nuclear reactor fleet, and support the deployment of next generation nuclear power systems.

Laboratory for Applied Nuclear Physics (LANPh) [lanph.mit.edu] Director: Prof. Areg Danagoulian, NSE. The research at the Laboratory for Applied Nuclear Physics is focused on using nuclear physics techniques to find technological solutions for societal problems. These include nuclear nonproliferation, technologies for treaty verification, nuclear safeguards, and cargo security.

Laboratory for Nuclear Innovation in Fission Technologies (NIFT)
[http://web.mit.edu/kshirvan/www/] NIFT focuses on acceleration of innovations in nuclear fission technology by utilizing an integrated system-level approach. Innovation is the key for unlocking nuclear energy technology potential for deployment and to support its sustainability. The innovations at NIFT are based on three pillars: artificial intelligence, additive manufacturing and high performing materials. NIFT uses a multi-disciplinary approach including detailed economics and regulatory assessment to quantify the impact of innovations and formulate accelerated pathways for their adoption.

Laboratory for Electrochemical Interfaces [https://yildizgroup.mit.edu/] Director: Professor Bilge Yildiz (NSE/DMSE). The lab's research focuses on laying the scientific groundwork and proof- of-principle material systems for the next generation of high-efficiency devices for energy conversion and information processing, based on solid state ionic-electronic materials

Laboratory for Nuclear Security and Policy (LNSP) [http://lnsp.mit.edu] Director, R. Scott Kemp (NSE). LNSP is home to interdisciplinary research that aims to solve the social challenges arising from nuclear technologies. Research has focused in areas such as the detection of nuclear proliferation, the proliferation risk of emerging fuel-cycle technologies, verification technologies for arms control treaties, and the detection of smuggled nuclear material in cargo. LNSP researchers combine a broad range core analytical methods, ranging from low-energy nuclear physics to information science, and history to international politics.

Laboratory for Innovation in Fusion Technologies (LIFT) The Laboratory for Innovations in Fusion Technologies (LIFT) is dedicated to exploring disruptive technology solutions for fusion energy with private-sector sponsors within the broader framework of the PSFC, NSE, and the MIT Energy Initiative. Research topics include materials, liquid-immersion blankets and fusion fuels. Commonwealth Fusion Systems and ENI are present sponsors.

Laboratory for Thermal-Hydraulics Engineering and Design (The Red Lab) The laboratory for Thermal-Hydraulics Engineering and Design is dedicated to exploring the fundamentals and the application of advanced heat transfer solutions for power technology. The research portfolio includes the development of high-resolution diagnostics and data processing tools, first-of-a-kind experimental capabilities, heat transfer enhancement techniques, and modeling approaches.

MIT Computational Reactor Physics Group (CRPG) [http://crpg.mit.edu/] CRPG focuses on the development of novel methodsand algorithmsfor accurate and efficient nuclear reactor simulations. Better simulations help the nuclear industry set well-informed safety margins, but also enable assessment of innovative new fuel and reactor designs. From accurate quantification of uncertainty of neutron cross sections to Exascale simulation of nuclear systems, computing is pushing the boundaries of reactor physics.

Quantum Engineering Group [http://qeg.mit.edu] Director: Professor Paola Cappellaro (NSE). The Quantum Engineering Group develops transformative tools based on the fundamental laws of quantum physics, with applications in quantum simulation of complex systems, quantum computation beyond current classical limits, and quantum sensing of atomic-scale phenomena in the physical and life sciences.

The Quantum Measurement Group [https://qm.mit.edu/] The Quantum Measurement Group aims to develop innovative materials characterization techniques. Our research primarily employs x-ray, neutron, and electron spectroscopies to probe the microscopic interaction mechanisms within quantum materials. These investigations focus on the intricate interplay between charge, orbital, spin, and lattice degrees of freedom, aiming to advance energy and information technologies. Our group specializes in studying topological materials, which exhibit unique properties due to their topological nature. These materials hold promising potential for energy and information applications. We grow high-quality single crystalline and nanostructured crystals of these materials, conduct high-precision thermal transport measurements in the quantum realm, and apply advanced spectroscopic probes to study their fundamental excitations at spatial-temporal scales that are otherwise challenging to achieve. Additionally, we integrate artificial intelligence with theoretical models to analyze our experimental data and propose novel measurement methodologies. This synergistic approach ensures a collaborative environment, fostering partnerships both within the group and with researchers worldwide.

Collaborating MIT Academic & Research Units
Computer Science and Artificial Intelligence Laboratory (CSAIL) [https://www.csail.mit.edu/]
Laboratory for Nuclear Science [http://web.mit.edu/lns/]
Research Laboratory of Electronics [https://www.rle.mit.edu/]

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	3	2	2
Masters	2	2	2
PhD	2	3	3

Number of Graduates

Graduate Student Enrollment: 20 Masters/ 14 Ph.D.

Distance Education Program
Offers Nuclear Engineering Courses and Degrees Online
Through the University Network of Excellence in Nuclear Engineering
(www.unene.ca)

Nuclear Science and Engineering Faculty

Adriaan Buijs (905-525-9140 x24925) [buijsa@mcmaster.ca] Ph.D.**,** Utrecht University**,** 1987. The physics of nuclear reactor cores, in particular of Small and Very Small Modular Reactors; Development of analysis tools for research in reactor physics.
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John C. Luxat, Professor (905-525-9140 x 24670) [luxatj@mcmaster.ca] Ph.D.**,** University of Windsor**,** 1972. Nuclear safety; severe accidents; thermalhydraulics; advanced fuel cycles; safety analysis methodology; reactor core physics. Professional Engineer.
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Other Faculty

Simon Day, Adjunct Professor, Engineering Physics (905-525-9140 x23191) [dayse@mcmaster.ca] Ph.D., McMaster University, 2003. Reactor Physics with specialties in Safety Analysis, Operations Support, and Criticality Safety. Leading the Reactor Analysis group at the McMaster Nuclear Reactor.

Laurence Leung, Adjunct Professor, Ph.D., Ottawa. Manager, Advanced Concepts & Collaboration at Canadian Nuclear Laboratories (retired) [leungl@sympatico.ca].
Website: experts.mcmaster.ca/display/leungl1

Thambiayah Nitheanandan, Industry Professor, Director, Canadian Nuclear Safety Commission. Ph.D., Manitoba. [nitheant@mcmaster.ca]. Website:experts.mcmaster.ca/display/nitheant

Nik Popov, Adjunct Professor, Program Director at University Network of Excellence in Nuclear Engineering (UNENE) Ph.D., Zagreb. [npopov@mcmaster.ca]experts.mcmaster.ca/display/npopov

Ben Rouben Adjunct Professor, Ph.D. (Massachusetts Institute of Technology), Reactor Physics, [roubenb@alum.mit.edu]. Website: experts.mcmaster.ca/display/roubeb1

Victor G. Snell, Industry Professor (905-525-9140 x20168) [snellv@mcmaster.ca], Ph.D., Universityof Toronto, 1972. Nuclear safety concepts and philosophy, safety system design and performance, safety analysis, education of staff working in the nuclear industry, nuclear licensing.
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Peter Vilks, Adjunct Professor (204-753-2311 ext. 63172) [peter.vilks@cnl.ca] Ph.D., McMaster University, 1984. Geochemistry and transport of radionuclides such as sorption, colloids, natural organics and diffusive and advective processes in fractures and rock matrix.

Nuclear Science and Engineering Research Centers

McMaster Nuclear Reactor (MNR). MNR is an open-pool type Materials Test Reactor (MTR) with acore of low enriched uranium (LEU) fuel that is moderated and cooled by light water. Primary and secondary cooling systems act to remove the heat that is generated in the core of the reactor, with external cooling towers acting as the ultimate thermal sink. The reactor is housed within a concrete containment building and generally operates weekdays from 8 a.m. until 12 midnight at a thermal power of 3 MW. The nuclear reactor was designed with its end use as a multi-purpose research facility in mind. Its open-pool design provides ready access to the reactor core and allows for easy insertion and removal of samples for neutron irradiation, imparting a degree of flexibility that many other classes of reactors lack. As well, several beam-tubes were built into the reactor structure: today, the neutron beams extracted by these tubes are used for applications including neutron radiography and neutron diffraction experiments. MNR also has an industrial hot cell inside the reactor containment building for handling highly radioactive samples. Staff at the McMaster Nuclear Reactor conduct hundreds of thousands of neutron irradiations every year, many in support of industry (mining exploration, environmental samples). MNR is a world leader in the production of iodine-125, a radioactive isotope that is used in the treatment of prostate cancer, with hundreds of doses produced each week. Neutrons from MNR are also used by Nray Services Inc. to conduct quality assurance testing on turbine blades for jet engines using the neutron radiography facility at one of the beam-ports. Research activities at MNR continue to expand, with a new neutron diffractometer installed in 2009 and a state-of-the-art positron beam facility currently being designed.

The Centre for Advanced Nuclear Systems (CANS) CANS provides a unique world-class capability to advance research in three focus areas: 1) nuclear materials, 2) nuclear safety thermalhydaulic behavior, and 3) health physics.

CANS McMaster is comprised of three primary facilities, namely:

1. Post-Irradiation Examination of Nuclear Materials: an irradiated materials examination facility consisting of a suite of custom designed, fabricated and installed hot cells including an instrument room containing a shielded dual beam Scattering Electron Microscope/Focused Ion Beam (SEM/FIB) and a Transmission Electron Microscope (TEM).
2. Nuclear Materials Characterisation Facility: a materials characterization and analysis facility that will be used to investigate the mechanical behavior of existing and newly developed materials (including irradiated in-reactor core components, GEN IV materials and technology). The facility includes a Three Dimensional Atom Probe (3DAP) and Scattering Electron Microscope/Focused Ion Beam (SEM/FIB).
3. Thermal Testing Facility: to obtain experimental data to develop and test nuclear safety thermal hydraulic models. This facility include a heated Flow Loop, upgraded power supply with 265 kW capacity, cooling heat exchangers, a new heat transfer test section and 3-D Tomography and Highspeed Video instrumentation for state-of-the-art visualization.

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	19	25	18
Masters	10	5	6
Ph.D.	3	4	2

Number of Graduates

Graduate Student Enrollment: 6 Masters/ 13 Ph.D. ABET
ABET Accreditation: Bachelor of Science (BS) Degree in Nuclear Engineering

Nuclear Science and Engineering Faculty

Joseph W. Newkirk, Department Chair and Professor (573-341-6294) [jnewkirk@mst.edu] Ph.D., University of Virginia, 1983. Additive manufacturing, powder metallurgy, wear and corrosion resistant alloys, high temperature materials, aerospace materials, nuclear materials, and heat treating.
Website: https://sites.mst.edu/jnewkirk/

Ayodeji B. Alajo, Associate Professor (573-341-6609) [alajoa@mst.edu] Ph.D., Texas A&M University, 2010. Nuclear systems design and modeling; Advanced fuel cycles; Nuclear waste minimization; Nuclear forensics.
Website: https://people.mst.edu/faculty/alajoa/index.html

Carlos H. Castano, Associate Professor (573-341-6766) [castanoc@mst.edu] Ph.D., Nuclear Engineering**,** University of Illinois at Urbana Champaign**,** 2007**.** Nano particles with radiation, simulation nuclear systems, Nuclear Materials, Vacuum breakdown. Website: https://people.mst.edu/faculty/castanoc/index.html

Joseph T. Graham, Associate Professor (573-341-7759) [grahamjose@mst.edu] Ph.D., The University of Texas at Austin, 2013. Radiation effects; Radiation-solids interactions; Nuclear Materials; Nuclear Ceramics. Website: https://people.mst.edu/faculty/grahamjose/index.html

Joshua P. Schlegel, Associate Professor (573-341-7703) [schlegelj@mst.edu] Ph.D. Purdue University, 2012. Two-phase flow experiments and modeling, nuclear reactor thermal hydraulics, heat transfer, fluid mechanics. Website: https://people.mst.edu/faculty/schlegelj/index.html

Shradha Agarwal, Associate Professor, Ph.D., Helium mobility and its effects on the microstructure/physical properties of different advanced ultra-high temperature ceramics (TiC, ZrC and TiN), for their possible use in BISO (Bi-structural isotropic)/TRISO (Tri-structural isotropic) fuel forms for Gen. IV reactors.

Shoaib Usman, Associate Professor **(**573-341-4745) [usmans@mst.edu] Ph.D., University of Cincinnati, 1997. Thermo-fluids; natural convection and passive safety; radiation detection; nuclear fuel cycle and consent-based siting of spent nuclear fuel.
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Other Faculty

Muthanna Al-Dahhan, Curators' Distinguished Professor of Chemical & Biochemical Engineering (573-341-7518) [aldahhanm@mst.edu] Ph.D., Washington University – Saint Louis, 1993. Reactor Engineering, Transport-Kinetic Integration, Advanced Measurement and Computational Techniques, Clean and Alternative Energy and Environment, Multiphase Reaction Engineering, and Advanced Measurement Techniques. Website: https://works.bepress.com/muthanna-al-dahhan/

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Joseph Smith, Professor & Laufer Endowed Chair in Energy (573-341-4294) [smithjoseph@mst.edu] Ph.D., Brigham Young University, 1990. Research focuses includes developing resilient hybrid energy systems with fossil, nuclear and renewable energy. Develops and applies multi-physics computational tools to analyze turbulent flow inside Small Modular Nuclear Reactors and to analyze dynamic behavior in large processing facilities including Foundries and Aluminum Smelters.
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Ph.D., University of California-Berkeley, 1977. Nuclear materials, radiation effects, mechanical properties, nuclear plant life extension. Website: http://nuclear.mst.edu/facultystaffandfacilities/kumar/

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Nuclear Science and Engineering Research Centers

The Nuclear Reactor: The Missouri S&T Reactor (MSTR) is a Nuclear Regulatory Commission (NRC) licensed 200-kilowatt pool-type reactor that is used to support the engineering and science activities on campus. Using the facility, the reactor staff provides high quality hands-on laboratory, research and development, training, and project opportunities. MSTR uses High Assay Low Enriched Uranium (HALEU) fuel in a 30,000-gallon pool of water and is cooled by natural convection. The open pool design allows access to the reactor core where experiments and samples to be irradiated can be positioned, with flexible core configurations to support loading a variety of experimental facilities. MSTR is equipped with a pneumatic sample irradiation system (rabbit), a neutron beam port that provides a collimated neutron beam, a thermal column, and multiple in-core wet/dry irradiation enclosures. Additionally, a counting laboratory is maintained at the facility, including modern gamma spectroscopy equipment (both scintillation and solid state), liquid scintillation counter, thermoluminescent dosimeter reader, and corresponding data acquisition systems. The reactor is open to the greater campus community for research, training, and outreach, and offers an operator licensure program for interested students and others. MSTR can support training and educational activities in-person and remotely via a distance education system.

Radiation Measurements and Spectroscopy Laboratory (RMSL): The Nuclear Engineering RMSL is equipped with NIM standard electronic units, neutron and gamma scintillation detectors, solid -state detectors, coincidence electronics, and multi-channel analyzers connected to PCs for automated data analysis. The laboratory also includes two portable EG&G HPGe detectors, a Canberra Thermoluminescent dosimeter with state-of-the-art electronics and software, and a Lynx digital data analysis system for remote web-based experimental capacity.

Graduate Center for Materials Research: The facilities of the Graduate Center for Materials Research, and metallurgical engineering and nuclear engineering departments are available for nuclear materials-related research. The Nuclear Materials Lab allows for use of instruments such as a scanning electron microscope, a 300 keV EM-430 Phillips transmission electron microscope, an atomic absorption spectrometer, and a quadrupole mass spectrometer.

Advanced Radiography and Tomography Lab (ARTLAB): The Nuclear Engineering ARTLAB is designed to perform radiation imaging for medical or industrial purpose. Students have opportunities of running Monte Carlo simulation codes for radiation imaging systems and experimenting with digital x -ray radiography, x-ray computed tomography (CT), neutron radiography, neutron CT, etc. The technologies developed in the lab can be applied to either medical imaging or non-destructive inspection of various materials or objects including nuclear fuel rods and plates. On-going research include flat-panel x-ray source for imaging, neutron and x-ray combined CT, and digital image processing.

Neutron Generator Laboratory: The neutron generator laboratory has a D-D neutron generator that produces approximately 10^9 neutrons/sec. The neutron generator is available for both graduate and undergraduate research and education at Missouri S&T. Examplesof research using the neutron generator are reactor kinetics research, the study of two-phase flow, research in nuclear forensics and radiochemistry, particle tracking in complex flows, and the photon-neutron tomography for mechanical testing of structural materials.

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	15	25	31
Masters	20	26	23
PhD	17	22	19

Number of Graduates

Graduate Student Enrollment: 48 Masters/ 122 Ph.D.
ABET Accreditation: Bachelor of Science (BS)
Degree in Nuclear Engineering

Distance Education Program
Offers Nuclear Engineering Courses and Degrees Online
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Nuclear Science and Engineering Faculty

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Dmitriy Y. Anistratov, Professor (919-513-4353) [anistratov@ncsu.edu] Ph.D., Mathematical and Physical Sciences Institute for Mathematical Modeling, Russian Academy of Sciences, 1993. Computational physics, transport theory, numerical analysis. Website: https://www.ne.ncsu.edu/people/dyanistr

Maria N. Avramova, University Faculty Scholar, Director of Consortium for Nuclear Power, Coordinator of CTF User's Group (919-513-6354) [mnavramo@ncsu.edu] Ph.D., Pennsylvania State University, 2007. Reactor thermal-hydraulics; core design; transient and safety analysis; multi-physics multi-scale simulations; verification and validation; uncertainty and sensitivity analysis.
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Benjamin W. Beeler, Assistant Professor (919-515-3737) [bwbeeler@ncsu.edu] Ph.D., Georgia Institute of Technology, 2013. Computational nuclear materials science; Next generation nuclear fuels; Molten salt systems for nuclear applications; radiation damage and defect evolution; Density functional theory; Molecular dynamics.

Igor A. Bolotnov, Professor (518-542-8939) [igor_bolotnov@ncsu.edu] Ph.D., Rensselaer Polytechnic Institute, 2008. Multiscale approaches for nuclear reactor simulations; development of new spectral cascade transfer multiphase flow. Website: https://www.ne.ncsu.edu/people/iabolotn/

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Robert Hayes, Associate Professor (919-515-2321) [rbhayes@ncsu.edu] Ph.D., University of Utah, 1999. Nuclear nonproliferation technologies; radiation detection; air monitoring; luminescence and magnetic resonance; Monte Carlo radiation transport modeling. Professional Engineer.
Website: https://www.ne.ncsu.edu/people/rbhayes

Lingfeng He, Associate Professor (919-515-0465) [lhe8@ncsu.edu] Ph.D., Chinese Academy of Sciences, 2009. Materials behavior in extreme environments; environmental degradation of materials in nuclear power systems; microstructure, mechanical/thermal properties, and structural integrity/durability of materials and components. Website: https://ne.ncsu.edu/people/lhe8/

Jason Hou, Associate Professor (919-513-6705) [jason.hou@ncsu.edu] Ph.D., Pennsylvania State University, 2013. Multi-physics reactor simulation; advanced reactors; in-core fuel management; fuel cycle analysis; uncertainty analysis; plant simulator.
Website: https://www.ne.ncsu.edu/people/jasonhou/

Kostadin N. Ivanov, Distinguished Professor (919-515-1466) [knivanov@ncsu.edu] Ph.D., Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences, 1990. Nuclear reactor physics and multi-physics; nuclear core design and safety analysis; nuclear plant simulations; validation and verification of multi-physics calculations; uncertainty quantification and propagation in modeling and simulation. Website: https://www.ne.ncsu.edu/people/knivanov

Wen Jiang, Assistant Professor (919-515-5877) [wjiang8@ncsu.edu] Ph.D., Duke University, 2015. Advanced computational methods for nuclear material modeling; multi-physics and multi-scale simulations.
Website: https://ne.ncsu.edu/people/wjiang8/

Djamel Kaoumi, Professor (919-515-2301) [dkaoumi@ncsu.edu] Ph.D., Pennsylvania State University, 2007. Metallic materials degradation in harsh environments; irradiation damage and effects in advanced alloys for structural and cladding applications; mechanical properties and deformation mechanisms of high- temperature; advanced alloys; characterization techniques of predilection.
Website: https://www.ne.ncsu.edu/people/dkaoumi

Elizabeth Kautz, Assistant Professor (919-515-1466) [ekautz@ncsu.edu] Ph.D., Rensselaer Polytechnic Institute, 2018. Laser produced plasmas and materials; laser-material interaction, hydrodynamics and chemistry evolution in laser produced plasmas; materials degradation phenomena. Website: https://ne.ncsu.edu/people/ekautz/

Florian M. Laggner, Assistant Professor (919-513-3603) [fmlaggner@ncsu.edu] Ph.D., Technische Universität Wien, Austria, 2017. High temperature plasmas in magnetic confinement fusion devices; plasma edge physics and plasma diagnostics; confined plasma research; harsh environment of a fusion pilot plant. Website: https://ne.ncsu.edu/people/fmlaggner/

Amanda Lietz, Assistant Professor (919-515-3658) [alietz@ncsu.edu] Ph.D., University of Michigan, 2019. Computational modeling of low temperature plasmas; computational modeling of plasma sources; design and optimization of plasma sources. Website: https://ne.ncsu.edu/people/alietz/

Lisa M. Marshall, Assistant Extension Professor, Director of Outreach, Retention and Engagement, ANS President (919-515-5876) [lmmarsha@ncsu.edu] Masters, UNC at Chapel Hill, 2012. Energy geography; (nuclear) engineering education; (inter)national co-curricular scholarship; geographic information systems (GIS); STEM education for women and under-served populations.
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John K. Mattingly, Professor (919-515-0224) [john_mattingly@ncsu.edu] Ph.D., University of Tennessee, Knoxville, 1998. Neutron interrogation methods; estimation of SNM properties; monitoring and surveillance of SNM production; use, storage, movement, and disposition activities to help foster transparency in NMC&A; safeguards, arms control, and nonproliferation.
Website: https://www.ne.ncsu.edu/people/jkmattin

Korukonda L. Murty, Progress Energy Distinguished Professor (919-515-3657) [murty@ncsu.edu] Ph.D., Cornell University 1970. Nuclear materials, radiation effects, mechanical properties, creep, fatigue and fracture mechanics, processing and characterization of nanograin structured metals, NDE, NMR.
Website: https://www.ne.ncsu.edu/people/murty

Abderrafi Ougouag, Research Professor (866-495-7440) [amougoua@ncsu.edu] Ph.D., University of Illinois at Urbana-Champaign, 1986. Reactor physics; computational methods; reactor design and optimization.
Website: https://ne.ncsu.edu/people/amougoua/

Scott Palmtag, Research Professor (919-865-6696) [sppalmta@ncsu.edu] Ph.D., Massachusetts Institute of Technology, 1997. Reactor physics; multiphysics applications; computational methods.
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Katharina Stapelmann, Associate Professor, ABET Coordinator (919-515-5987) [kstapel@ncsu.edu] Ph.D., Ruhr University Bochum, Germany, 2013. Low-temperature plasma; plasma medicine; interactions of technical plasmas with biological systems; plasma diagnostics.
Website: https://ne.ncsu.edu/people/kstapel/

Xu Wu, Assistant Professor (919-515-6570) [xwu27@ncsu.edu] Ph.D., University of Illinois at Urbana-Champaign, 2017. Calibration, Validation, Data Assimilation, Uncertainty and Sensitivity Analysis; Scientific Machine Learning; Computational Statistics and Reduced Order Modeling.
Website: https://www.ne.ncsu.edu/people/xwu27

Ge Yang, Associate Professor (919-515-5267) [gyang9@ncsu.edu] Ph.D., Northwestern Polytechnical University, China, 2007. Novel materials for radiation sensor applications; effects of radiation on electronic, photonic and structural materials; radiation imaging and measurement.
Website: https://ne.ncsu.edu/people/gyang9/

John Zino, Associate Teaching Professor (910-398-2832) [jfzino@ncsu.edu] Ph.D., Georgia Institute of Technology, 1985. High-temperature advanced sodium fast reactor technologies; BWR systems engineering; nuclear methods and software; safety and radiological analysis. Website: https://ne.ncsu.edu/people/jfzino/

Other Faculty

Joseph M. Doster, Professor Emeritus (919-515-3658) [doster@ncsu.edu] Ph.D., North Carolina State University, 1982. Systems dynamics, systems simulation, Computational methods in two-phase flow, Systems simulation in support of advanced control and diagnostic systems, design and optimization of advanced targetry for the cyclotron production of radiopharmaceuticals. Website: https://www.ne.ncsu.edu/people/doster

Donald J. Dudziak, Professor Emeritus (505-667-7983) (505-661-3832) [dudziak@ncsu.edu, dudziak@lanl.gov] Ph.D., University of Pittsburgh, 1963. Transport and Reactor Theory. Professional Engineer.

David Kropaczek, Adjunct Professor [dkropac@ncsu.edu] Ph.D., North Carolina State University. Fuel cycle and plant optimization, computational reactor physics and thermal-hydraulics, and numerical algorithm development.

Michael Simpson, Adjunct Associate Professor (208-520-1068) Ph.D., Princeton University. Nuclearfuel cycle.

Matthew Stokely, Adjunct Associate Professor (919-619-3851) Ph.D., North Carolina State University. Advanced characterization methods.

Avneet Sood, Adjunct Assistant Professor (505-667-2119) [sooda@lanl.gov] Ph.D., North Carolina State University, 2000. Monte Carlo methods and code development for radiation transport; Application of radiation transport codes to radiation detection problems.

Paul J. Turinsky, Professor Emeritus (919-515-5098) [turinsky@ncsu.edu] Ph.D., University of Michigan, 1970. Computational reactor physics; nuclear fuel management and mathematical optimization; validation and verification of software; uncertainty quantification; data assimilation and optimum experimental design; adaptive model refinement; multiphysics simulation.
Website: https://www.ne.ncsu.edu/people/turinsky/

Kuruvilla Verghese, Professor Emeritus. Ph.D., Iowa State University. Reactor Engineering/Fuel Cycles.

Monroe Wechsler, Adjunct Professor (919-515-2301) Ph.D., Columbia University. Nuclear materials, radiation effects.

Nuclear Science and Engineering Research Centers

Nuclear Reactor Program operates the 1MW PULSTAR with the following major experimental facilities: Positron Annihilation Spectroscopy, Ultracold neutron source, neutron diffractometer, neutron imaging.
Director: Ayman I. Hawari

Consortium for Nuclear Power (CNP)
Director: Maria Avramova
Website: https://www.ne.ncsu.edu/wp-content/uploads/2017/06/CNP-Flyer.pdf

COBRA-TF (CTF)
Coordinator: Maria Avramova
Website: https://ne.ncsu.edu/rdfmg/cobra-tf/

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	7/21-6/22	7/22-6/23	7/23-6/24
Masters	1	3	
PhD	7	3	

Number of Graduates

Graduate Student Enrollment: 3 Masters/ 22 Ph.D.
ABET Accreditation: Bachelor of Science (BS) Degree in Engineering with Nuclear Minor

Nuclear Science and Engineering Faculty

Lei (Raymond) Cao, Professor and Director of The Ohio State University Nuclear Reactor Laboratory (614-247-8701) [Cao.152@osu.edu] Ph.D.**,** The University of Texas at Austin**,** 2007. Instrumentation and Sensors; In-pile Instrumentation; Radiation Detection; Neutron Radiography/Tomography; PGNAA, NDP, Radiation Effects on Electronics. Website: https://nars.osu.edu/

Tunc Aldemir, Professor (614-292-4627) [aldemir.1@osu.edu] Ph.D., University of Illinois, 1978. Dynamic system reliability; probabilistic risk assessment. Website: https://mae.osu.edu/people/aldemir.1

Praneeth Kandlakunta, Research Assistant Professor (614-247-8439) [kandlakunta.1@osu.edu]. Ph.D., The Ohio State University, 2014. Nuclear instrumentation; Radiation Detection; Radiation Effects in Materials and Devices; High-efficiency fast-switching X-ray sources; X-ray imaging. Website: https://mae.osu.edu/people/kandlakunta.1

Marat Khafizov, Associate Professor (614-292-2544) [Khafizov.1@osu.edu] Ph.D., University of Rochester, 2008. Radiation effects on physical properties of materials, nuclear fuel and ceramics, thermal transport, in-pile sensors, optical spectroscopy and ultrasonics. Website: https://mae.osu.edu/people/khafizov.1

Carol S. Smidts, Professor (614-292-6727) [smidts.1@osu.edu] Ph.D., Universite Libre de Bruxelles, Belgium, 1991. Reliability Engineering; Probabilistic Risk Assessment; Software Reliability; Software Safety; Dynamic Risk Assessment; Human Reliability; Digital Systems Risk and Reliability. Website: https://mae.osu.edu/people/smidts.1

Richard Vasques, Assistant Professor (510-340-0930) [vasques.4@osu.edu] Ph.D., University of Michigan, 2009. Particle transport; radiative transfer; mathematical and computational modeling of transport phenomena; reactor theory; acceleration schemes; diffusion theory.
Website: https://mae.osu.edu/people/vasques.4

Dean Wang, Associate Professor (614-292-1337) [wang.12239@osu.edu] Ph.D., Massachusetts Institute of Technology, 2003. Transport Theory and Computation; Nuclear reactor design, modeling and simulation; Nuclear reactor systems and safety. Website: https://ncg.engineering.osu.edu

Other Faculty

Thomas E. Blue, Professor Emeritus (614-292-0629) [blue.1@osu.edu] Ph.D., University of Michigan, 1978. Space nuclear systems; advanced nuclear reactor instrumentation, including semiconductor sensors, static and dynamic characterization of radiation-induced degradation of semiconductor power devices; fiber-optics. Website: https://mae.osu.edu/people/blue.1

Richard Denning, Professor Emeritus (614-736-1793) [denningrs.8@gmail.com] Ph.D., University of Florida**,** 1967**.** Probabilistic Risk Assessment; Severe Accident Phenomena; Advanced Reactor Source Term Methodology; Regulatory Analysis.

Steven J. Maheras, Lecturer (614-486-5350) [Maheras.1@osu.edu] Ph.D., Colorado State University**,** 1988**.** Health physics; radioactive waste management; decontamination and decommissioning; transportation risk assessment; radiological and nuclear terrorism; and radiation dose reconstruction.

Nuclear Science and Engineering Research Centers

The Ohio State University Nuclear Reactor Laboratory (OSUNRL)
The OSUNRL is a major asset of the OSU NE Program and is a partner facility of DOE Nuclear Science User Facilities. The OSUNRL houses the OSURR a 500-kW pool type reactor, a Co-60 high-dose rate irradiation facility, and a sub-critical assembly.
Website: http://reactor.osu.edu

Laboratories:
Academic Center of Excellence (ACE) in Instrumentation, Control and Safety Structure
OSU Director: C. Smidts
OSU Co-Director: T. Aldemir
Website: https://rrl.osu.edu/

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	39	32	34
Masters	19	18	10
Ph.D.	0	4	5

Number of Graduates

Nuclear Science and Engineering Faculty

Akira Tokuhiro, Professor (905-721-8668)

Kirk Atkinson, Associate Professor (905-721-8668 x5501), (kirk.atkinson@ontariotechu.ca) Ph.D. in Physics, King's College London, UK. Applied radiation physicist with experience in radiation science, reactor physics, radiation transport, shielding, detector physics, radiation imaging and computational methods.

Hossam A. Gaber, Professor of Nuclear Engineering (905-721-8668 x5497) [hossam.gaber@ontariotechu.ca] Ph.D.

Glenn Harvel, Professor of Nuclear Engineering (905-721-8668 x5508) [Glenn.Harvel@ontariotechu.ca] Ph.D., McMaster University. Small Nuclear Reactors, Nuclear plant ageing and design, decommissioning, multiphase flow, instrumentation for multiphase flow, neutron radiography.

Daniel Hoornweg, Associate Professor of Energy (905-721-8668 x5560) [daniel.hoornweg@ontariotechu.ca] Ph.D., University of Toronto. Energy and material flows of cities, urban systems, sustainability, smart cities, renewable energy, waste management, integrated energy and transportation systems.

Brian Ikeda, Associate Professor of Nuclear Engineering (905-721-8668 x5523) [Brian.Ikeda@ontariotechu.ca] Ph.D., University of Newcastle upon Tyne. Corrosion of materials in molten fluoride salts, electrochemical and physical behavior of fluorine generating anodes, corrosion of nuclear waste container materials, stress assisted corrosion cracking of metals, radioactive waste management, localized corrosion, elevated temperature corrosion.

Matthew Kaye, Associate Professor of Nuclear Engineering (905-721-8668 x5524) [Matthew.Kaye@ontariotechu.ca] Ph.D., Queen's University. Nuclear materials, high temperature materials chemistry, phase diagram development, nuclear fuel behavior, aqueous chemistry of nuclear materials and corrosion.

Lixuan Lu, Professor of Nuclear Engineering (905-721-8668 x5526) [Lixuan.Lu@ontariotechu.ca] Ph.D., University of Western Ontario. Nuclear power plant instrumentation and control, distributed control, network control systems, reliability and safety of I&C Systems, risk-informed decision-making, nuclear based hydrogen generation.

Rachid Machrafi, Professor of Nuclear Science (905-721-8668 x5522) [rachid.machrafi@ontariotechu.ca] Ph.D., Joint Institute for Nuclear Research. Transmutation of nuclear waste, health physics and dosimetry, radiation detection technology, radiation techniques, space radiation, Monte Carlo modelling and education technology.

Jennifer McKellar, Associate Professor of Energy (905-721-8668 x5498) [jennifer.mckellar@ontariotechu.ca] Ph.D., University of Toronto. Techno-economic and environmental assessments of energy systems. Options for improving the sustainability of energy systems. Tools in support of decision-making.

Eleodor Nichita, Associate Professor of Nuclear Engineering (905-721-8668 x5527) [Eleodor.Nichita@ontariotechu.ca] Ph.D., Georgia Institute of Technology. Neutronic design and analysis methods for advanced nuclear reactors, reactor kinetics and control, neutron and radiation transport, mathematical modeling and numerical analysis.

Igor Pioro, Professor of Nuclear Engineering (905-721-8668 x5528) [Igor.Pioro@ontariotechu.ca] Ph.D.

Edward Waller, Professor of Nuclear Engineering (905-721-8668 x5521) [Ed.Waller@ontariotechu.ca] Ph.D., Rensselaer Polytechnic Institute. Applied health physics, radiation detection, dosimetry, biological effects of radiation, risk analysis, non-intrusive investigation, threat detection and security.

Other Faculty

John Froats, Nuclear Engineer in Residence (905-721-8668 x5507) [john.froats@ontariotechu.ca] B.Eng. McMaster University, Electrical engineering, nuclear plant design.

Filippo Genco, Associate Teaching Professor (905-721-8668 ext.5444)[Filippo.Genco@ontariotechu.ca] Ph.D. Purdue University, 2013. Plasma Material Interactions; Magnetic Fusion Applications; Radiation damage in materials; Advanced numerical methods; Renewable Energies and Alternative Technologies; Nuclear and electric propulsion; Direct energy conversion systems and applications; NanoFluids & Nanopatterning applications.

Nuclear Science and Engineering Research

SIMULATION LABORATORY
The simulation lab contains a state-of-the-art computer and display system for simulation of nuclear power plants, such as the Pickering and Darlington nuclear-electric generating units.

AEROSOL AND RADIATION RESEARCH LABORATORY
A state-of-the-art aerosol research laboratory is used to investigate potential hazards from terrorist use of radiological dispersal devices (RDDs). The research is widely applicable to determination of hazards from airborne radioactive contaminants. Dr. Ed Waller.

CORROSION AND ELECTROCHEMISTRY LABORATORY The corrosion and Electrochemistry lab is set-up to investigate the electrochemical processes that drive corrosion at elevated temperatures. A particular emphasis is placed on the chemical and electrochemical processes associated with localized corrosion processes such as localized corrosion and stress assisted corrosion cracking. Special facilities are used to examine processes in molten salts that range from melting point, but noxious fluoride salts to high temperature metal chloride salts. A variety of electrochemical methodologies are available to interrogate localized corrosion processes. Dr. Brian Ikeda.

NUCLEAR DESIGN LABORATORY
The primary mission of the Nuclear Design Laboratory is to study multi-disciplinary interfaces and integrated designs related to nuclear technology. Dr. Glenn Harvel.

HIGH PERFORMANCE COMPUTING AND VISUALIZATION LAB
The High-Performance Computing and Visualization Lab is set up for the investigation of computationally and output intensive problems that appear in reactor and radiation physics. It supports research into parallel algorithms and into methods for displaying large amounts of data in a meaningful way using three- dimensional graphic representations. Dr. Eleodor Nichita.

NUCLEAR MATERIALS LABORATORY

The nuclear materials laboratory investigates and characterizes metals, alloys, and aqueous systems that are important in nuclear reactor systems and other energy production facilities. The lab houses an X-ray Diffractometer capable of characterizing samples at both room temperature and elevated temperatures. Custom-built vessels allow for exploration of aqueous systems up to 250 ºC. The experimental work can provide fundamental thermochemical data that supports applied thermodynamic modelling work also performed in this laboratory. Dr. Matthew Kaye.

ADVANCED PLASMA ENGINEERING LABORATORY

Advanced Plasma Engineering Laboratory (UOIT) specializes in high-density, high-energy plasma research and thermal engineering research. The research has numerous applications in nuclear fusion, aerospace, waste-to-energy, oil and gas, nanotechnology, biochemical instruments, and manufacturing. The APEL lab emphasizes on innovations in plasma generation, diagnostics, and experimentations, and their applications on multiple disciplines. The plasma generation includes inductive and capacitive plasma discharge. Experimental work includes ion optics, propulsion, and energy harvesting. Dr. Hossam Gaber.

ENERGY SAFETY AND CONTROL LABORATORY

Energy Safety and Control Laboratory (ESCL) specializes in advanced safety and control systems and their applications in nuclear, energy and plasma systems. Research includes: Development of probabilistic risk models for accurate NPP safety verification; Improved performance of safety and shutdown systems and recovery operation in NPP; Improved NPP performance with intelligent control systems; and Fault propagation modeling and real time safety verification of NPP. Experimental work on fault diagnosis in control loops, CATHENA simulation code, and uncertainty estimation software tools. Dr. Hossam Gaber

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	28	32	32
Masters	29	34	55
Ph.D.	7	6	5

Number of Graduates

Graduate Student Enrollment: 158 Masters/ 30 Ph.D.
ABET Accreditation: BS Nuclear Engineering; BS Radiation Health Physics

Distance Education Program
Offers Nuclear Engineering Courses & Degrees Online
http://ne.oregonstate.edu/

Nuclear Science and Engineering Faculty

Brian G. Woods, School Head and Professor (541-737-2343) [brian.woods@oregonstate.edu] Ph.D., University of Maryland, 2001. Experimental and computational fluid dynamics and heat transfer; nuclear reactor thermal-hydraulics; nuclear reactor safety. Website: https://engineering.oregonstate.edu/people/brian-woods

Samuel A. Briggs, Associate Professor (541-737-7838) [samuel.briggs@oregonstate.edu] Ph.D., University of Wisconsin-Madison, 2016. Materials development for next-generation nuclear reactors; microstructural characterization and microscopy of radiation damage in materials; materials degradation in liquid sodium and molten salt environments; combined effects of superimposed environmental stressors. Website: https://engineering.oregonstate.edu/people/samuel -briggs

Tianyi Chen, Assistant Professor (541-737-8190) [tianyi.chen@oregonstate.edu] Ph.D., Texas A&M University, 2015. Nuclear materials – Utilizing in-situ mechanical and thermophysical testing, as well as scaling analysis, to advance the mechanistic understanding of materials' performance in harsh environments, with the goal of accelerating the deployment of next-generation fission and fusion technologies. Research interests include fuel, structural and functional materials, radiation and environmental effects, microstructure – property – performance relationship, advanced

characterization, multiscale mechanical testing, and physics-based modeling. Website: https://engineering.oregonstate.edu/people/tianyi-chen

Alexander (Sasha) Chemey, Assistant Professor (541-737-7076) [alexander.chemey@oregonstate.edu] Ph.D., Florida State University, 2019. Nuclear science and technologies including focuses on the interface of nuclear chemistry, physics, and engineering, addressing generational challenges in power production, radioactive waste storage, and production of valuable isotopes. Website: https://beav.es/alchemist

Abi T. Farsoni, Associate Professor (541-737-9645) [abi.farsoni@oregonstate.edu] Ph.D., Oregon State University, 2006. Radiation Detectors; real-time digital electronics; FPGA design; digital pulse processor; nuclear medical imaging systems; radioxenon detection; nuclear weapon test monitoring; low-cost radiation spectroscopy; direction-sensitive detectors. Website: http://web.engr.oregonstate.edu/~tavakola/

Izabela Gutowska, Assistant Professor (541-737-7053) [izabela.gutowska@oregonstate.edu] Ph.D., Oregon State University, 2016. Nuclear reactor thermal hydraulics, with emphasis on the application of computational fluid dynamics. Experimental and computational thermal hydraulics aspects involving Generation IV and small modular reactors. Computational fluid dynamics verification, validation, and uncertainty analyses. Reactor safety and advanced reactors design. CFD-Enabled Digital Twinning. Website: https://engineering.oregonstate.edu/people/izabela -gutowska

Kathryn A. Higley, Professor (541-737-0675) [kathryn.higley@oregonstate.edu] Ph.D., Colorado State University, 1994. Health physics; human and ecological risk assessment; environmental pathway analysis; environmental radiation monitoring; radionuclide and hazardous chemical transport; radiochemistry; neutron activation analysis; nuclear emergency response planning; environmental regulations; risk communication. Certified Health Physicist. Fellow of the Health Physics Society, President National Council on Radiation Protection and Measurements. Website: https://engineering.oregonstate.edu/people/kathryn-higley

Trevor Kent Howard, Assistant Professor, (541-737-6152) [trevor.howard@oregonstate.edu] Ph.D., Oregon State University, 2018. Thermal Hydraulics, Experiment and Simulation Coupling (Hybrid Simulation, Digital Twins, Virtual-Sensing, and VVUQ for complex systems), Computational Multiphysics, Scaling. Website: https://engineering.oregonstate.edu/people/trevor-howard

Wade Marcum, Senior Associate Dean and Professor (541-737-3018) [wade.marcum@oregonstate.edu] Ph.D., Oregon State University, 2010. Nuclear reactor thermal hydraulics; computational fluid dynamics; reactor safety; flow induced vibration; advanced reactor design. Website: https://engineering.oregonstate.edu/people/wade-marcum

Madicken Munk, Assistant Professor (541-737-2343) [munkm@oregonstate.edu] Ph.D., University California, Berkeley, 2017. Radiation Transport, Reactor Physics, Hybrid Methods, Scientific Computing and Scientific Software. Website: https://engineering.oregonstate.edu/people/madicken-munk

Camille J. Palmer, Associate School Head and Associate Professor (541-737-7065) [camille.palmer@Oregonstate.edu] Ph.D., University of Cincinnati, 2003. International nuclear security and nonproliferation, concepts and approaches for nuclear safeguards implementation, and nuclear data and radiation transport for nuclear forensic signature development. Website: https://engineering.oregonstate.edu/people/camille-palmer

Todd S. Palmer, Professor (541-737-6306) [todd.palmer@oregonstate.edu] Ph.D., Nuclear Engineering and Scientific Computing, University of Michigan, 1993. Deterministic and Monte Carlo techniques for radiation transport; computational fluid dynamics; reactor physics; general numerical methods; nuclear criticality safety; radiation hydrodynamics; transport in stochastic mixtures, high performance computing. Website: https://engineering.oregonstate.edu/people/todd -palmer

Steven R. Reese, Associate Professor, Radiation Center Director, (541-737- 2344) [steve.reese@oregonstate.edu] Ph.D., Colorado State University, 1997. Regulatory Compliance; Reactor Dosimetry; Neutron Radiography; Neutron Depth Profiling; Prompt Gamma Neutron Activation Analysis. Certified Health Physicist. Website: https://engineering.oregonstate.edu/people/steven-reese

Qiao Wu, Professor (541-737-7066) [qiao.wu@oregonstate.edu] Ph.D., Purdue University**,** 1995. Nuclear reactor thermal-hydraulics, two-phase flow theory and experiments, multiphase flow instrumentation, nuclear reactor safety, scaling analysis of complex systems, neutron radiography for two-phase flow visualization, nuclear system design, fuel enrichment, system safety analysis code validation. Website: https://engineering.oregonstate.edu/people/qiao-wu

Haori Yang, Associate Professor (541 737-7057) [Haori.Yang@oregonstate.edu] Ph.D., University of Michigan at Ann Arbor, 2009. Non-destructive interrogation techniques; development of innovative radiation sensors; laser spectroscopy; general applications of nuclear engineering. Website: : https://engineering.oregonstate.edu/people/haori-yang

Other Faculty

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David M. Hamby, Professor Emeritus (541-737-8682) [david.hamby@oregonstate.edu] Ph.D., University of North Carolina, 1989. Health physics; beta dosimetry; beta spectroscopy; radiation instrumentation; environmental health physics; environmental transport; fate and transport model analysis; radiation risk; uncertainty analysis. Website: https://engineering.oregonstate.edu/people/david -hamby

Joshua Handley, Assistant Professor, Senior Research (541-737-2343) [joshua.handley@oregonstate.edu] Ph.D., Oregon State University, 2023. Next-generation radiation detector design, rapid prototyping, large-scale monitoring systems, and novel analysis techniques. Website: https://engineering.oregonstate.edu/people/joshua-handley

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Guillaume Mignot, Assistant Professor Senior Research (541-737-6382) [guillaume.mignot@oregonstate.edu] Ph.D. University of Wisconsin-Madison, 2008. Study nuclear reactor severe accidents, development of advanced instrument and metering techniques for condensation film measurement, operational manager of the Naval Reactor Test Loop (NRTL). Website: https://engineering.oregonstate.edu/people/guillaume-mignot

Alena Paulenova, Professor Emeritus (541-737-7070) [alena.paulenova@oregonstate.edu] Ph.D. Radiochemistry; chemistry of fuel cycle; advanced separations methods for used fuel reprocessing and fuel waste forms; behavior of actinides and fission products; environmental and biomedical applications. Website: https://engineering.oregonstate.edu/people/alena-paulenova

Jose N. Reyes, Jr. Professor Emeritus (541-737-2343) [jose.reyes@oregonstate.edu] Ph.D.**,** University of Maryland**,** 1986. Thermal hydraulics; multi-phase fluid flow; scaling analyses; reactor safety; reactor system design. Professional Engineer. Website: https://engineering.oregonstate.edu/people/jose - reyes-jr

Gurpreet Singh, Facilities Engineer 2 (541-737-7940) [gurpreet.singh@oregonstate.edu] M.S. City University, London, 2011. Signals, instrumentation, thermal hydraulic experimental research. Website: https://engineering.oregonstate.edu/people/gurpreet-singh

Ilham Variansyah, Assistant Professor, Senior Research (541-737-7891) [variansi@oregonstate.edu] Ph.D., University of Michigan, 2020. Computational radiation transport, nuclear reactor physics, general numerical and Monte Carlo methods, and high-performance computing. Website: https://engineering.oregonstate.edu/people/ilham-variansyah

Aaron W. Weiss, Senior Faculty Research Assistant I (541-737-7084) [weissa@oregonstate.edu] M.S. Oregon State University, 2017. Thermal hydraulics experimental research, instrumentation development, operational manager of the Hydro-Mechanical Fuel Test Facility (HMFTF). Website: https://engineering.oregonstate.edu/people/aaron-weiss

Nuclear Science and Engineering Research Center

OSU Radiation Center: The school's experimental programs are housed in the **OSU Radiation Center**. Research facilities include a 1.1 MW TRIGA Mark II nuclear reactor; the Energy Exploration Center; the Advanced Thermal-Hydraulic Research Laboratory (ATHRL) which includes the NuScale Integral Systems Test Facility (NIST) facility; the Advanced Nuclear Systems Engineering Laboratory (ANSEL) which includes the High Temperature Test Facility (HTTF) and the Hydro-Mechanical Fuel Test Facility (HMFTF); the Advanced Nuclear Instrumentation Development Laboratory; the Nuclear Metallurgy Laboratory; the Sodium Test Facility; the Radioecology Research Laboratory; the Laser Imaging of Fluids and Thermal (LIFT) Facility, a Radiochemical Analytical Laboratory with radio-HPLC- and radio-LC-IS-MS/MS systems; a Cobalt-60 Gamma Irradiator; Neutron Radiographyfacilities; Gamma and Alpha Spectrometryfacilities; RadiologicalInstrumentCalibration facilities;Liquid Scintillation Counting Systems; and Thermoluminescent Dosimetry Systems.

Computational research is supported through access to several school-specific multinode CPU servers and the College of Engineering High Performance Computing Cluster (HPC) - a heterogeneous mix of about 130 servers providing nearly 4000 CPU cores, over 200 GPUs, and over 43 TB of total RAM.

PENNSYLVANIA STATE UNIVERSITY

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	93	89	89
Masters	62	50	77
Ph.D.	48	57	50

Number of Graduates

Graduate Student Enrollment: _M_asters/ ____Ph.D.
ABET Accreditation: BS

Distance Education Program
Offers Nuclear Engineering Courses and MEng Degree Online
https://www.worldcampus.psu.edu/degrees-and-certificates/nuclear-engineering-masters/overview

Nuclear Science and Engineering Faculty

Jon Schwantes, Professor and (Acting) Head (814-863-8575) [Jon.Schwantes@psu.edu] Ph.D., Texas A&M University, 2002. Aqueous environmental radiochemistry, actinide chemistry, super-heavy element chemistry and physics, astrophysical nucleosynthesis, science-based stockpile stewardship, nuclear materials science, and nuclear forensics.

Jean Paul Allain, Professor [allain@psu.edu] Ph.D., University of Illinois at Urbana-Champaign, 2001. Engineering design for global social impact; ion-driven nanostructures on metals, semiconductors and polymers; advanced nanostructured bio interfaces for regenerative medicine; multi-scale computational surface physics; plasma-surface and materials interactions in fusion devices; in-situ surface characterization techniques; irradiation surface science. *Currently on assignment to DOE Fusion Energy.*

Fan-Bill Cheung, Professor of Mechanical and Nuclear Engineering (814-863-4261) [fxc4@psu.edu] Ph.D.**,** University of Notre Dame**,** 1974. Director of Global Nuclear Power Safety Center; Solidification and Melting; Turbulent Natural Convection; Two-Phase Flow and Heat Transfer; Nuclear Reactor Thermal Hydraulics and Safety; Thermal Processing of Materials; Thermal Behavior of High-Temperature Ablatives; Dense Spray and Atomization.

Marek Flaska, Associate Professor of Nuclear Engineering (814-867-4754) [mxf5309@psu.edu] Ph.D. Applied Physics, Delft University of Technology, 2006. Detection of neutrons, gamma rays and x-raysfor nuclear nonproliferation, safeguards, and forensics; radiation imaging; data-acquisition and data-processing electronics; fundamental nuclear physics.

Jeffrey A. Geuther, Associate Director for Operations of the RSEC and Associate Research Professor of Nuclear Engineering (814-863-2745) [jag671@psu.edu] Ph.D., Rensselaer Polytechnic Institute, 2007. Nuclear reactor control systems; neutron activation analysis; radiation detection; radioisotope production; neutron beam experiments.

Miaomiao (Mia) Jin, Assistant Professor (814-863-6938) [mmjin@psu.edu] Ph.D., Massachusetts Institute of Technology, 2019. Computational materials science and engineering; Materials behavior in extreme environments; Development of radiation-tolerant structural materials; Defects and microstructure evolution in materials; Materials informatics.

Amanda Johnsen, Assistant Professor (814-865-6351) [amj15@psu.edu] Ph.D., University of California, Berkeley, 2008. Production and purification of radioisotopes; neutron activation analysis; chemistry of used nuclear fuel and reprocessing; environmental radiochemistry; radiochemistry education.

Hojong Kim, Associate Professor of Materials Science and Engineering and Nuclear Engineering (814-865-3117) [huk29@psu.edu] Ph.D., Massachusetts Institute of Technology, 2004. Electrochemistry; Pyroprocessing; Molten Salt Chemistry; Corrosion.

Saya Lee, Assistant Professor of Nuclear Engineering (814-865-0043) [sjl6054@psu.edu] Ph.D., Texas A&M University, 2014. Experimental Nuclear Thermal Hydraulics; Turbulent Flow Analysis; Flow in Porous Media; Boiling Heat Transfer; Non-Water-Coolant Experiment; Development of Thermal-Fluid Measurement Techniques.

Elia Merzari, Professor (814-863-7469) [ebm5351@psu.edu] Ph.D., Tokyo Institute of Technology,2008. Nuclear thermal-hydraulics; Computational fluid dynamics; Supercomputing; Multiphysics simulations.

Arthur T. Motta, Professor and Graduate Program Chair of Nuclear Engineering (814-865-0036) [atm2@psu.edu] Ph.D., University of California- Berkeley**,** 1988. Materials behavior in the nuclear reactor environment, especially nuclear fuel cladding.

Dipanjan Pan, Professor and Graduate Program Chair of Nuclear Engineering (814-865-0036) [dfp5170@psu.edu] Ph.D., Indian Institute of Technology, 2002. Translational nanomedicine, nuclear medicine, imaging, and diagnostics.

Asok Ray, Distinguished Professor of Mechanical and Nuclear Engineering (814-865-6377) [axr2@psu.edu] Ph.D., Northeastern University. Instrumentation and control; Signal processing and identification; Robotics and automation; Nondestructive evaluation; Fatigue and fracture; Aerospace systems; Power systems.

Federico Scurti, Assistant Professor (814-867-1783) [fus191@psu.edu] North Carolina State University, 2019. Nuclear materials science for fusion and fission energy, novel sensor development.

Kenan Unlu, Director of Radiation Science and Engineering Center and Professor of Nuclear Engineering (814-865-6351) [kxu2@psu.edu] Ph.D., University of Michigan, 1989. Development and Applications of Nuclear Analytical Techniques; Neutron Depth Profiling; Cold Neutron Prompt Gamma Activation Analysis; Neutron Radiography, Neutron Activation Analysis; Radiation Detection; Radiochemistry; Nuclear Forensics and Nuclear Security Education and Research.

Stefano Terilizzi, Assistant Professor of Nuclear Engineering (814-863-6222) [sbt5572@psu.edu] Ph.D., Georgia Institute of Technology, 2020. Advanced reactor design, reactor physics, computational numerical methods development.

Xing Wang, Assistant Professor of Nuclear Engineering (814-863-0413) [xvw5285@psu.edu] Ph.D., University of Wisconsin-Madison, 2016. Radiation damage in materials; Materials in extreme environments; Development of structural materials for advanced reactors; Electron microscopy and atom probe tomography.

Douglas Wolfe, Metals, Ceramics and Coatings Processing Department Head for the Applied Research Laboratory, Professor of Materials Science and Engineering, and Engineering Science and Mechanics and Nuclear Engineering. (814-865-0316) (dew125@arl.psu.edu). Ph.D., The Pennsylvania State University, 2001. Structure-processing-property-performance relationships and the development of coatings and materials characterization.

Other Faculty

Martin de Jesus Nieto Perez, Associate Teaching Professor (814-865-3644) [mnieto@psu.edu] Ph.D., University of Illinois at Urbana-Champaign, 2004. Low and high temperature plasma interactions, neutronics and kinetic modeling/design relevant to the insertion of fusion-based neutron sources.

Massimiliano Rosa, Assistant Teaching Professor of Nuclear Engineering (814-865-4863) [mzr127@psu.edu] Ph.D., The Pennsylvania State University, 2007. Fundamentals of Nuclear Engineering; Nuclear Reactor Theory; Mathematics and Computation; Deterministic Transport Methods.

Jogender Singh, Professor of Materials Science and Engineering (814-863-9898) [jxs46@psu.edu] Ph.D., Banaras Hindu University, 1981. Powder sintering (metal, ceramic and composite) by Field Assisted Sintering Technology (FAST); design and development of heat sink components; coatings for extreme environments; materials characterization and evaluation.

Matthew Zerphy, Professor of Practice (814-863-6720) [mxz206@psu.edu] M.S.S.I, National Intelligence University, 2002. Nuclear Security Threat Analysis; Nuclear Security System Design.

Nuclear Science and Engineering Research Centers

Detector Development Laboratory (DDL): Established in 2017, DDL features a variety of detectors (including a muon detector and a large number of NaI detectors) as well as electronics and computational stations. The group performs both fundamental and applied radiation detection related research and provides graduate and undergraduate students with hands-on learning opportunities.

FUNNEL - FUsioN NEutron Laboratory - A dual-tube D-T neutron-generation system is available in this laboratory: one tube with a neutron output of 1e8 n/sec and the other tube with a neutron output of 1e10 n/sec. The neutron-producing tubes have separate control units so they can be operated independently. The lower-neutron-outputpart of the system will provide a capability to accurately detect the alpha particles resulting from the D-T fusion reaction, thereby allowing for accurate measurements of neutron emission angles.

LEAF - Laboratory for Experiments to Advance Fission - A low-backscatter, stand-alone, off-campus, suppressed-room-return building houses a large-area, neutron/gamma-ray multi-detector system to significantly reduce the back-scatter effects that are relevant for time-correlated experiments. The experimental building has dimensions of 25' x 25' x 25' and is internally completely covered, including the floor and ceiling, by 1" of borated polyethylene to minimize the neutron return. Also, because the building is a pre-fabricated, stand-alone structure, only a minimal amount of concrete has been used to minimize the gamma-ray return. This unique laboratory is used for measurements of high-fidelity prompt and delayed gamma-ray/neutron data.

Radiation Science and Engineering Center: The Radiation Science and Engineering Center (RSEC) is a unit under the College of Engineering and the Vice President for Research at Penn State. The RSEC promotes research, education, and applications of radiation and nuclear science and engineering to students, faculty, and staff at Penn State, as well as to scientists in universities, governments, and industries worldwide. The RSEC facilities include the Penn State Breazeale Reactor (PSBR), gamma-ray irradiation facilities (in-pool irradiator and dry irradiator), the Neutron Beam Laboratory, the Hot Cell Laboratory, the Radionuclear Applications Laboratory, the Radiochemistry Teaching Laboratory, the Nuclear Security Nuclear Science & Engineering Education Sourcebook Page 103 Education Laboratory, the Subcritical Graphite Reactor Facility, and various radiation detection and measurement laboratories. The PSBR is a 1 MW, TRIGA reactor with moveable core in a large pool and with pulsing capabilities. A new core moderator assembly and five new beam ports including a cold neutron source were installed at the PSBR in the summer of 2018. An expanded neutron beam hall has recently been added to RSEC as a joint initiative with the Ken and Mary Alice Lindquist Department of Nuclear Engineering in order to accommodate the first and only Small Angle Neutron Scattering capability at a US University (expected to be operational January, 2025).

REACTR (Radioisotope Examination, Analysis, and Characterization, Techniques & Research) Lab. Housed within RSEC, includes ~1400 sqft of radiochemistry wet lab space, a radiation detection lab, actinide Mossbauer spectroscopy development, and a rad-dedicated, Time-Of-Flight Inductively Coupled Plasma Mass Spectrometer coupled with a Laser Ablation system for elemental mapping of nuclear materials.

POLYTECHNIQUE MONTRÉAL

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	7/21-6/22	7/22-6/23	7/23-6/24
Masters	2	5	2
PhD	0	1	0

Number of Graduates

Graduate Student Enrollment: 1 Masters/ 5 Ph.D.

Nuclear Science and Engineering Faculty

Alain Hébert, Professor (514-340-4711 x 4519) [alain.hebert@polymtl.ca] Ph.D., Paris-XI**,** 1980.Reactor Physics; lattice code; neutron diffusion theory. Professional Engineer.

Other Faculty

Cornelia Chilan, Senior Research Scientist (514-340-4780) [cornelia.chilian@polymtl.ca]**;** Ph.D., Polytechnique Montréal, 2008. Nuclear engineering; Reactor design and operation; Radioactive materials; Nuclear physics; Experimental methods and instrumentation.
Website: https://www.polymtl.ca/expertises/en/chilian-cornelia

Guy Marleau, Adjunct Professor (514-340-4711 x 4204) [guy.marleau@polymtl.ca] Ph.D., McGill University, 1983. Reactor Physics.

Alberto Teyssedou, Adjunct Professor (514-340-4711 x 4522) [alberto.teyssedou@polymtl.ca] Ph.D. Ecole Polytechnique de Montreal, 1987. Diphasic flow; thermodynamics; supercritical flows.

Nuclear Science and Engineering Research Centers

SLOWPOKE Laboratory – Development of the method of neutron activation analysis for greater sensitivity, accuracy and ease of use. Application of neutron activation analysis for the chemical analysis of new materials, plastics, rocks, biological tissues and archaeological artefacts. Research collaborations in environmental sciences, medicine and archaeology. Production of radioactive tracers for research in chemistry (dynamics of fluidized bed reactors) and medicine (digestive system).

Research Staff
Director of Laboratory and reactor operator: Cornelia Chilian
Reactor operator and research fellow: Darren Hall
Research fellow: Cyril Koclas

Specialized Equipment
SLOWPOKE nuclear reactor; five gamma-ray spectrometers.

PURDUE UNIVERSITY

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kreece@purdue.edu
Website: https://engineering.purdue.edu/NE

	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	29	24	31
Masters	4	10	41
Ph.D.	4	9	6

Number of Graduates

Graduate Student Enrollment:
48 Masters / 40 Ph.D.
ABET Accreditation: B.S. (N.E.)

Nuclear Engineering Faculty

Seungjin Kim, Professor and Capt. James F. McCarthy, Jr. and Cheryl E. McCarthy Head of the School of Nuclear Engineering (765-494-5742) [seungjin@purdue.edu] Ph.D.**,** Purdue University**,** 1999. Thermal-hydraulics; Reactor Safety; Modeling of two-phase flow and fluid particle interactions; interactions; interfacial area transport modeling; Two-phase flow experiment and instrumentation; Thermal-hydraulics systems analysis code.

Hany S. Abdel-Khalik, Professor (765-496-9718) [abdelkhalik@purdue.edu] Ph.D., North Carolina State University, 2004. Validation and Uncertainty Quantification. Big Data Analytics and Data Assimilation. Cyberattack-resilient Control Systems. LWR Computational Reactor Physics.

Hitesh Bindra, Associate Professor (765-496-2433) [hbindra@purdue.edu] Ph.D. University of Illinois, 2010. Thermal hydraulics, Advanced Reactors, Energy Storage, Statistical and Machine Learning http://nuest-lab.com/

Stylianos Chatzidakis, Assistant Professor, Associate Reactor Director and Director of Nuclear Engineering Radiation Laboratory (765-496-9698) [schatzid@purdue.edu] Ph.D., Purdue University, 2016. Artificial Intelligence and deep learning; functional sensors; remote sensing; muon tomography; nonproliferation; nuclear fuel cycle; advanced reactor monitoring.

Chan Choi, Professor (765-494-6789) [choi@purdue.edu] Ph.D.**,** Southern Illinois University**,** 1973**.** Fusion Plasma Engineering; Compact Tori Plasma Studies; Inertial Confinement Beam Target Stability; Space Propulsion; Energy Conversion; Nuclear Nonproliferation.

Allen Garner, Professor and Undergraduate Program Chairman (765-494-0618) [algarner@purdue.edu] Ph.D. University of Michigan - Ann Arbor, 2006. Biomedical applications of pulsed power and plasmas; Plasma Physics; Pulsed Power; High Power Microwaves; Theoretical biophysics.

Ahmed Hassanein, Paul L. Wattelet Distinguished Professor (765-496-9731) [hassanein@purdue.edu] Ph.D.**,** University of Wisconsin, Madison**,** 1982**.** Plasma Material Interactions; Magnetic and Inertial Fusion Research; Computational Physics and Hydrodynamics; Extreme Ultraviolet Lithography; Laser and discharge produced plasma; Radiation and Particle Transport in Materials; Biomedical Engineering Applications**.**

Mamoru Ishii, Walter H. Zinn Distinguished Professor (765-494-4587) [ishii@purdue.edu] Ph.D.**,** Georgia Institute of Technology**,** 1971. Two-phase flow experiments and modeling research; 3-D two -fluid model and interfacial area transport.

Martin Lopez-De-Bertodano, Associate Professor (765-494-9169) [bertodan@purdue.edu] Ph.D.**,** Rensselaer Polytechnic Institute**,** 1992. Experimental Two-Phase Flow; Computational Fluid Dynamics; Turbulence; Thermal Hydraulics and Reactor Safety; Nuclear Systems Simulation.

Xiaoyuan Lou, Associate Professor (765-496-2327) [lou49@purdue.edu] Ph.D.; Georgia Institute of Technology, 2010. Advanced manufacturing; Structural materials; High-temperature properties; Material degradation; Irradiation effects; Environmentally assisted cracking; Creep https://web.ics.purdue.edu/~lou49/

Shripad T Revankar, Professor, Graduate Programs Chairman (765-496-1782) [shripad@purdue.edu] Ph.D., Karnatak University, 1983. Two-Phase Flow and Heat Transfer; Reactor Safety and Thermal Hydraulics; Next Generation Reactors; High Conductivity Nuclear Fuel; Multiphase Flow in Packed Beds (Trickle Bed Reactors); Multiphase Instrumentation Development; Fuel Cell -Design and Simulation; Regenerative Fuel Cell; Distributed Energy Generation; Hybrid Nuclear Systems; Hydrogen Generation - High Temperature Thermochemical Reactions; Hydrogen Storage. Website: http://cobweb.ecn.purdue.edu/~shripad/

Rusi Taleyarkhan, Professor of Nuclear Engineering (765-313-1876) [rusi@purdue.edu] Ph.D.(1982), M.B.A.(1980), Rensselaer Polytechnic Institute**.** Nuclear power engineering, safety, thermal-hydraulics; homeland security; combating nuclear terrorism via novel sensor development; Nano-to-macro scale applications of nuclear technology; acoustic inertial confinement fusion; radiation-matter interactions coupled with thermal hydraulics; metastable fluid technologies for nanoscale energetic burst generation; advanced nuclear particle detection technologies based on metastable fluid states; novel explosives and propellant systems for less-than-lethal and barrier penetration devices.

Lefteri Tsoukalas, Professor (765-496-9696) [tsoukala@purdue.edu] Ph.D.**,** University of Illinois**,** 1989. Neurofuzzy methodologies for complex power systems modeling, diagnostics and control; Intelligent instrumentation systems and sensors; Man-machine interface; Autonomous systems and robotics.

Yunlin Xu, Assistant Professor (765-496-9033) [yulin@purdue.edu] Ph.D., Purdue University, 2004. Nuclear reactor simulation method study; Nuclear reactor simulation code development; Multi-physics coupling; Nuclear reactor safety analysis; Nuclear reactor design and optimization; Nuclear reactor fuel cycle study; Methods for solving large scale linear and nonlinear systems.

Other Faculty

Valeryi Sizyuk, Research Associate Professor (765-494-4217) [vsizyuk@purdue.edu] Ph.D., Belarus State University, Minsk Belarus, 1997. Reactor Fusion; Plasma. Prof. V. Sizyuk has extensive background in computational physics, plasma physics and hydrodynamics, computing technologies and their application in high volume manufacture.

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	16	16	16
Masters	1	5	3
Ph.D.	6	4	3

Number of Graduates

Graduate Student Enrollment: 2 Masters/ 23 Ph.D.

Nuclear Science and Engineering Faculty

Yaron Danon, Professor, Director, Gaerttner Linear Accelerator and Nuclear Engineering Program Director (518-276-4008) [danony@rpi.edu] Ph.D., Rensselaer Polytechnic Institute, 1993. Accelerator technology and radiation applications; Nuclear data and instrumentation.
Website: http://www.rpi.edu/~danony

Hunter Belanger, Assistant Professor (518-276-3148) [belanh2@rpi.edu] Ph.D. Université Paris-Saclay 2022 Monte Carlo Particle Transport; Neutron Noise; Reactor Physics; Nuclear Data

Hyun Gook Kang, Professor, Chair, Nuclear Safety Review Board for RPI RCF (518-276-8251) [kangh6@rpi.edu] Ph.D., KAIST, 1999. Digitalized System Risk; Dynamic and Static Probabilistic Risk Assessment; Emergency Operation Procedure; Safety System Design
Website: https://faculty.rpi.edu/hyun-kang

Wei Ji, Professor, William H. Hernstadt '57 Faculty Fellow in Nuclear Engineering; Director of Rensselaer Walthousen Reactor Critical Facility (518-276-6602) [jiw2@rpi.edu] Ph.D., University of Michigan, 2007. Computational and Experimental Reactor Physics; Nuclear Energy System Design and Safety Analysis; Radiation Transport Theory and Computation; Multiscale and Multiphysics Computation; Heat and Mass Transfer Modeling for Multicomponent Multiphase Flow; Radiation Effects on Electronic Devices
Website: http://www.rpi.edu/~jiw2

Jie Lian, Professor (518-276-6081) [lianj@rpi.edu] Ph.D., University of Michigan, 2003. Nanoscale characterization and nanofabrication; Radiation damage and Radiation effects; Materials behavior under extreme environment; Advanced nuclear waste form and effective nuclear waste management; Accident tolerant fuels; Validation of fuel modelling and simulation
Website: https://faculty.rpi.edu/jie-lian

Li (Emily) Liu, Professor, Department Head of Industrial and Systems Engineering (518-276-8592) [liue@rpi.edu] Ph.D., Massachusetts Institute of Technology, 2005. Condensed Matter Physics; Nuclear Materials; Neutron and X-ray Scattering and Methodology; Nuclear Thermal Data; Energy Policy; Community Engagement; Disaster Communications; Engineering Education
Website: https://faculty.rpi.edu/emily-liu

Bimal K Malaviya, Professor; Curriculum Coordinator (518-276-8578)[malavb@rpi.edu]
Ph.D., Harvard University, 1964. Radioactive waste management; fission and fusion reactor physics and technology; biomedical applications; human factor engineering.

Shanbin Shi, Assistant Professor (518-276-8406) [shis3@rpi.edu] Ph.D., Purdue University, 2015. Thermal- hydraulics in advanced high-temperature nuclear reactors; Two-phase flow experiments and modeling research; Small modular reactor development; Reactor safety analysis.

Other Faculty

Clinton Ballinger, Professor of Practice [ballic2@rpi.edu] Ph.D., University of Michigan, 1991. Nuclear reactor physics; Monte Carlo charged and neutral particle transport; Research translation and entrepreneurship; Optoelectronics, display, and energy conversion technologies.
https://faculty.rpi.edu/clint-ballinger

Robert C. Block, Professor Emeritus (518-276-6404) [blockr@rpi.edu] Ph.D.**,** Duke University**,** 1956**.** Nuclear structure and data; Accelerator technology; Neutron reactions; Industrial applications of radiation; Radiation effects in microelectronics; Nondestructive testing.

Thomas C. Haley, Professor of Practice (518-276-6975) [haleyt2@rpi.edu] Ph.D., Rensselaer Polytechnic Institute, 2000. Engineering education, nuclear criticality safety, mathematical and statistical modeling, quality assurance.

Richard T Lahey, Jr., Professor Emeritus (518-276-6351) [laheyr@rpi.edu**]** Ph.D.**,** Stanford University**,** 1971. Multiphase flow and boiling heat transfer; Nuclear reactor thermal-hydraulics and safety analysis; Sonofusion technology.

James E. Olson, Sr. Lecturer (518-276-2389) [olsonj7@rpi.edu] D. Eng., Rensselaer Polytechnic Institute, 2022. Nuclear waste management; Subatomic Particle Behavior; Energy Technology Development; Engineering Education Psychology.

Michael Z. Podowski, Professor Emeritus (518-276-4000) [podowm@rpi.edu] Ph.D.**,** Warsaw University of Technology**,** 1972**.** Reactor dynamics and safety; Applied mathematics; System stability; Two-phase flow and heat transfer**.**
Website: http://www.rpi.edu/~podowm

Don Steiner, Professor Emeritus (518-276-4016) [profsteiner@nycap.rr.com] Ph.D., Massachusetts Institute of Technology, 1967. Fusion systems analysis; plasma engineering; blanket design and overall fusion reactor design.

Nuclear Science and Engineering Research Centers

The **Gaerttner Linear Accelerator (LINAC) Center** has been engaged in active research continuously for over 45 years, and is centered around a multi-million dollar, high power, >60 MeV, L-band traveling wave, electron linear accelerator. The primary research thrust of the center is obtaining nuclear data for use in a variety of applications, ranging from the design of nuclear reactors and analysis of criticality to radiation damage and new nuclear medicine technologies. A newly constructed facility adds new research capabilities in the area of nuclear criticality safety, with a new detection system designed to measurethe probability of neutron capture in different materials.

The **Walthousen Critical Reactor Facility** is a low watt, fully functioning reactor for operational training and core physics studies and is available for student use in conjunction with modern nuclear radiation detection and characterization systems.

The **Multiscale Science & Engineering Center (MSEC)** was established in October 2006 to create a collaborative environment of faculty to develop and transition Multiscale technologies to industry and government. Rensselaer is among the first universities to recognize that a systematic multiscale theory combined with intensive technology transfer effort would propel the Institute's initiatives innumerous fields. One MSEC project is the VIP-Man Virtual Patient, with which researchers study multiscale human computing applications on radiation modeling in geometry modeling, radiation transport, treatment optimization, and X-ray CT imaging.

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jguinyard@scsu.edu

	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	11	3	5
Masters	0	0	0
Ph.D.	0	0	0

Number of Graduates

Graduate Student Enrollment: 25 Masters/ 0 Ph.D.

ABET Accreditation: Bachelor of Science (BS) Degree in Nuclear Engineering

Nuclear Science and Engineering Faculty

Musa B Danjaji, Professor, Department Chair, Academic Program Coordinator (803-516-4591) [mdanjaji@scsu.edu] Ph.D., University of Illinois, 1993. Nuclear Criticality; Nuclear Waste Management; Radiation Effects in Material; Alternative Energy Studies.

Joseph Boffie, Assistant Professor (803-536-7924) [jboffie@scsu.edu] Ph.D., University of Massachusetts, Lowell, 2019. Radiation science; Modeling and Simulation of Nuclear Reactor Systems; and Method Development (Neutron Transport Problems).

Kenneth C Okafor, Full time Adjunct Professor (803-516-4758) [kokafor@scsu.edu] Ph.D., The Ohio State University, 1988. Alternative Energy Studies; Nuclear Criticality.

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(Enrollment started in the Fall 2024 semester.)

ABET Accreditation (planned): Bachelor of Science (BS) Degree in Nuclear Engineering

Nuclear Science and Engineering Faculty

Jeffrey (Jeff) King, Professor and Founding Director, (931-372-3721) [jking@tntech.edu] Ph.D., Nuclear Engineering**,** University of New Mexico**,** 2006. Space nuclear technologies; nuclear reactor physics and design; computational methods; neutron imaging; nuclear materials**.**
Website: https://www.tntech.edu/directory/engineering/faculty/jeffrey-king.php

Other Faculty

Stephen Canfield, Professor, Department of Mechanical Engineering, (931-372-3254) [SCanfield@tntech.edu] Ph.D., Mechanical Engineering, Virginia Tech, 1997. Mobile Robotics for inspection, maintenance, and repair in unstructured environments; under EPRI direction, developed remote inspection technologies for all DCSS canisters (vertical and horizontal) produced by ORANO, Holtec, NAC; developed and field-implemented robotic-based cold spray technologies for DCSS (SONGS) and storage cannisters at WRPS; under DOE direction, developed ORSS (Off-Riser Sampling System) robot for WRPS. Website: https://www.tntech.edu/directory/engineering/faculty/stephen-canfield.php

David Dan, Assistant Professor, (931-372-6819) [ddan@tntech.edu] Ph.D., Florida State University, 2019. Lanthanide and actinide separations; radiation detection and quantification; lanthanide/actinide coordination chemistry; f-element materials.

Bruce W. Jo, Associate Professor and Director of ADAMS (Advanced Dynamics, Aerodynamics, and Mechatronic Systems) Laboratory, (931-372-6403) [bjo@tntech.edu] Ph.D., Mechanical Engineering**,** Columbia University**,** 2010. Aerodynamics; morphing structures; wind tunnel testing; dynamics; control; robotics; mechatronics. Website: https://www.tntech.edu/directory/engineering/faculty/bruce-jo.php

Mohan D. Rao, Professor and Chair of Mechanical Engineering (Acoustics, Vibrations, Damping and Design) Vibration and Acoustic Laboratory, (931-372-3270) [mrao@tntech.edu] Ph.D., Mechanical Engineering**,** Auburn University**,** 1988. Website: https://www.tntech.edu/directory/engineering/faculty/mohan-rao.php

Holly Stretz, Emeritus Professor, (931-392-3297) [hstretz@tntech.edu] Ph.D., Chemical Engineering, University of Texas – Austin, 2005. Reactor design; water purification; sensors development; materials (polymer) properties at extreme temperatures (liquid helium and liquid nitrogen); polymer processing and 3-D printing. Website: https://www.tntech.edu/directory/engineering/faculty/holly-stretz.php

Peng Zhang, Assistant Professor, (931-372-3323) [pzhang@tntech.edu]. Ph.D., Engineering Mechanics, Virginia Tech, 2016. Smart sensors and actuators; optimal control of shape morphing systems; mechanics of animal swimming and flying; aerodynamics of plants. Website: https://www.tntech.edu/directory/engineering/faculty/peng-zhang.php

Nuclear Science and Engineering Research Centers and Laboratories

Nuclear Energy Technology Laboratory – Provides hands-on experience with a variety of introductory nuclear energy topics, including radiation detection and measurement, shielding, radiation physics, radiation protection, and radiation interactions with matter.

Space Nuclear Technology Laboratory – Dedicated to the study of technologies and materials to support the deployment of nuclear technologies in space. Current areas of study include metal hydrides for high temperature moderators, heat pipe design and implementation, and advanced power conversion techniques.

Other Research Centers and Laboratories

ADAMS (Advanced Dynamics, Aerospace, and Mechatronic Systems) Laboratory – Student-based research laboratory to support various research and development activities, including CFD, wind tunnel testing, Stewart platform, UAVs, morphing structures, 3D printing, robotics manipulators, sensors, and highly interactive HRI (human-robot interaction) robot with ChatGPT and ML features enabled.

Polymer Processing Laboratory – Current areas of study include separations/extraction and recrystallization using patented massively arrayed microfluidic vessel, water purification and fouling of reverse osmosis membranes, materials development for both active and passive functions of remote sensors including nanoparticle sensors fluorescing in IR.

TEXAS A&M UNIVERSITY

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Website: http://engineering.tamu.edu/nuclear

	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	71	62	72
Masters	26	21	22
Ph.D.	19	18	15

Number of Graduates

Graduate Student Enrollment: 81 Masters/ 85 Ph.D.
ABET Accreditation: Bachelor of Science (BS) Degree in Nuclear Engineering

Nuclear Science and Engineering Faculty

Michael A. Nastasi, Department Head (979- 862-2636) [mikenastasi@tamu.edu] Ph.D., Cornell University, 1986. Materials for Extreme Nuclear Environments; Irradiation Induced Phase Transformations; Ion Irradiation and Plasma Modification Materials; Synthesis and Properties of High Strength Nanolayered Composites

Marvin L. Adams, Professor; Associate Director, Center for Large-scale Scientific Simulations, Ph.D., University of Michigan, 1986. Computational Method Development; Nuclear Reactor Analysis and Design. Professional Engineer.

Karim E. Ahmed, Associate Professor (979-847-6192) [karim.ahmed@tamu.edu] Ph.D., Purdue University, 2015. Multiscale modeling and simulations of materials, irradiation effects, co-evolution of microstructure and properties of materials.

Carlo Fiorina, Associate Professor (979-458-8165) [carlo.fiorina@tamu.edu] Ph.D., Advanced reactors; modeling and simulation; fusion energy

John Ford, Associate Professor (979-845-6271) [ford@tamu.edu] Ph.D., University of Tennessee at Knoxville, 1992. Health Physics; Radiation Biology; Medical Physics.

Yassin A. Hassan, Professor (979-845-7090) [y-hassan@tamu.edu] Ph.D**.,** University of Illinois**,** 1980**.** Nuclear Power Engineering: Thermal Hydraulics; Computational Fluid Dynamics. Professional Engineer.

Mark Kimber, Associate Professor (979-458-3952) [mark.kimber@tamu.edu] Ph.D., Purdue University, 2008. Experimental and Computational Thermal Hydraulics, Uncertainty Quantification in Isothermal and Non-isothermal Turbulent Flows and Two-Phase Heat Transport.

Karen Vierow Kirkland, Professor and Associate Department Head (979-458-0600) [vierow@tamu.edu] Ph.D., University of Tokyo, 1999. Nuclear Power Engineering: Thermal Hydraulics; Reactor Safety.

Craig Marianno, Associate Professor; Deputy Director, NSSPI (979-845 -6093) [marianno@tamu.edu] Ph.D., Oregon State University**,** 2000. Nuclear Security and Nonproliferation; Health Physics, Radioecology; Radiation Detection System Development; Emergency Response and Consequence Management.

Sean M. McDeavitt, Professor; Associate Vice Chancellor for National Laboratories (979-845-7551) [mcdeavitt@tamu.edu] Ph.D., Purdue University, 1992. Processing and Behavior of Nuclear Fuels, Materials, and Waste Forms; Radiation Science Applications; and Nuclear System Design and Demonstration. Laboratory: Fuel Cycle and Materials Laboratory (FCML) Website: https://engineering.tamu.edu/nuclear/research/facilities/fuel-cycle-materials-laboratory-fcml.html

Jim E. Morel, Professor; Director, Center for Large-Scale Scientific Simulations, TAMUS Co-Director, Center for Resilient National Security (979-845-6072) [morel@tamu.edu] Ph.D., University of New Mexico, 1979. Computational Methods Development for Radiation Transport, Radiation-Hydrodynamics, Uncertainty Quantification and Reduced-Order Methods.

Jean Ragusa, Professor and Associate Director, Institute for Scientific Computation (979-862-2033) [jean.ragusa@tamu.edu] Ph.D., Institut National Polytechnique de Grenoble, France, 2001. Computational Methods for Radiation Transport and Multiphysics Applications; Reactor Analysis and Design; Uncertainty Quantification and Data Science Applied to Nuclear Engineering.
Website: http://multiphysics.engr.tamu.edu

Lin Shao, Professor and Director, Undergraduate Program (979-845-4107) [lshao@tamu.edu] Ph.D., University of Houston**,** 2001**.** Nuclear Materials and Fuel Cycles.

Pavel V. Tsvetkov, Professor and Director, Graduate Program (979-845-7078) [tsvetkov@tamu.edu] Ph.D., Texas A&M University, 2002. Advanced Energy Systems Laboratory: Design and Demonstration of Advanced Nuclear Systems, Waste Minimization, Optimization, Systems Engineering, Data Science, Artificial Intelligence, Energy Sustainability and Environment, Direct Energy Conversion, Autonomous Control, Novel Instrumentation, Nuclear Security and Nonproliferation, Cybersecurity.

Mansung Yim, Professor (979-862-2616) [msyim@tamu.edu] Sc.D., Harvard University, 1994. Nuclear Nonproliferation; Innovative Nuclear Systems; Nuclear Energy Policy; Nuclear Waste Management.

Other Faculty

Leslie A. Braby, Senior Lecturer Emeritus; [labraby@tamu.edu]Ph.D., Oregon State University**,** 1972. Health Physics; Radiation Biology; Medical Physics.

Cable Kurwitz, Instructional Professor (979-845-6126) [kurwitz@tamu.edu] Ph.D**.,** Texas A&M University**,** 2009. Nuclear Power Engineering: Space Power; Thermal Hydraulics**.** Professional Engineer.
Website: https://itp.tamu.edu

William H. Marlow, Professor Emeritus [w-marlow@tamu.edu] Ph.D., University of Texas at Austin, 1973. Nuclear Materials and Fuel Cycles.

Warren Miller, Professor of Practice [wmiller@tamu.edu] Ph.D., Northwestern University, 1973.Nuclear Security; Computational Methods, Energy Policy.

Farheen Naqvi, Research Assistant Professor (470-334-2031) [fnaqvi@tamu.edu] Ph.D., Nuclear physics, engineering, radiation detection, nuclear security, nonproliferation.

Paul Nelson, Professor Emeritus; Ph.D., University of New Mexico, 1969. Nuclear Security and Nonproliferation.

Theodore Parish, Professor Emeritus, Ph.D. University of Texas, 1973. Reactor Physics.

Kenneth L. Peddicord, Senior Professor (979-845-5802) [k-peddicord@tamu.edu] Ph.D., University of Illinois, 1972. Nuclear Materials and Fuel Cycles. Professional Engineer.

Galina Tsvetkova, Senior Lecturer (979-845-4162) [tsvetkovag@tamu.edu] Ph.D., Texas A&M University**,** 2003. Nuclear Power Engineering-Reactor Analysis & Design; Small Nuclear Power & Co-Generation Applications.

Richard M. Waer, Professor of Practice (979-845-4161) [rwaer@tamu.edu] B.S., University of Arizona, 1989.

Nuclear Science and Engineering Research Centers

Center for Advanced Small Modular and Microreactors (CASMR): Dr. Yassin Hassan, Director. CASMR is dedicated to developing and proving technologies that deliver affordable, reliable, resilient, secure, flexible, and sustainable energy with unparalleled safety and zero-carbon emissions. By accelerating the development of new and transformative technologies, materials, and methods to make nuclear fission more affordable, CASMR aims to enable its rapid and secure deployment. Fostering a community of innovators, CASMR brings together the best and brightest ideas in research to create practical solutions that advance various industrial sectors, including space, manufacturing, emergency response, and defense.

Center for Large-scale Scientific Simulations (CLASS): Dr. Jim Morel, Director. CLASS' objectives are to advance the state of the art in large-scale scientific simulations, and to lead the development of educational programs whose participants will be exceptionally well qualified for careers in scientific simulation. http://class.tamu.edu

Center for Nuclear Security Science and Policy Initiatives (NSSPI): Dr. Craig Marianno, Deputy Director. The mission of NSSPI is to work collaboratively with national laboratories and other partners to develop and apply science and technology to detect, prevent, and reverse the proliferation of nuclear and radiological weapons and guard against nuclear terrorism; educate the next generation of leaders in the field of nuclear security sciences; and to study the policy implications of deploying new technologies. http://nsspi.tamu.edu.

Joint Center for Resilient National Security (JCRNS), Dr. Jim Morel, TAMUS Co-Director, JCRNS is a joint center of the Texas A&M University System and Los Alamos National Laboratory. The interim LANL Co-Director is Dr. John Scott. The mission of JCRNS is to develop and enhance national security capabilities between U.S. Department of Energy laboratories and U.S. universities supporting Los Alamos National Laboratory. The JCRNS will accomplish its mission through a series of programs that will develop over time. https://nationallabsoffice.tamus.edu/joint-center-for-resilient-national-security/

Nuclear Engineering and Science Center (NESC): Jere Jenkins, Director. The NESC is a multi- division center comprising reactor facilities, research laboratories, and the Nuclear Power Institute (NPI). The center contains two research reactors. The first is a 1 MW TRIGA reactor with multiple irradiation options that is used for student training, research, and isotope production. The second is a 5 W AGN-201M reactor that is useful for student training and low-power research activities. The NESC also has multiple research laboratories with hot cells, gloveboxes, materials processing equipment, and radiochemistry capabilities. http://nsc.tamu.edu

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	18	20	12
Masters	18	15	31
Ph.D.	20	22	14

Number of Graduates

Graduate Student Enrollment: 16 Masters/ 75 Ph.D.
ABET Accreditation: Bachelor of Science (BS) Degree in Nuclear Engineering

Nuclear Science and Engineering Faculty

Rebecca Abergel, Associate Professor [abergel@berkeley.edu] Ph.D., University of California, Berkeley, 2006. Nuclear, Radio, Inorganic, Coordination, and Biological Chemistry; Medical Countermeasures and Radiopharmaceuticals Development; Nuclear/Radiological Emergency Preparedness; Nuclear Fuel Related Element and Isotope Solution Thermodynamics and Separation.
Website: http://actinide.lbl.gov/ gtsc/BioAn/index.html

Lee Bernstein, Professor (510-642-4077)[labernstein@berkeley.edu] Ph.D., Rutgers University, 1994. Statistical properties of nuclear matter; Nuclear physics in high energy density plasmas; Neutron- induced reaction cross section measurements; Surrogate nuclear reactions.
Website: http:// nucleardata.berkeley.edu/

Massimilliano Fratoni, Associate Professor and Department Chair [maxfratoni@berkeley.edu] Ph.D., University of California, Berkeley, 2008. Advanced reactor design; computational methods; and nuclear fuel cycle. Current projects focus on accident tolerant fuels for light water reactors; molten salt reactors for used fuel transmutation; and thermal analysis of generic repository.
Website: http:// www.nuc.berkeley.edu/people/massimilliano-fratoni

Bethany L. Goldblum, Associate Professor and Head Graduate Advisor [bethany@nuc.berkeley.edu] Ph.D., University of California, Berkeley, 2007. Fundamental and applied nuclear physics, proliferation detection, and nuclear weapons policy. Executive Director, Nuclear Science & Security Consortium (NSSC), Founder and Director, Nuclear Policy Working Group (NPWG), Group Leader, Bay Area Neutron Group (BANG). Website: http://appliedphysics.nuc.berkeley.edu

Peter Hosemann, Professor and Master of Engineering Faculty Lead (510-717-5752) [peterh@berkeley.edu] Dr., Montanuniversitaet Leoben, Austria, 2008. Small scale materials testing on irradiated and unirradiated structural materials for nuclear applications; Investigating new advanced structural materials concepts (e.g. oxide dispersion strengthened steels) for nuclear applications using accelerated materials testing via ion beam irradiations; Liquid metal corrosion of structural materials for nuclear applications. Website: https://materials.nuc.berkeley.edu/

Per F. Peterson, Professor**,** William and Jean McCallum Floyd Endowed Chair (510-643-7749) [peterson@nuc.berkeley.edu] Ph.D., UC Berkeley, 1988. High-temperature fission and fusion energy systems; topics related to the safety and security of nuclear materials and waste management: heat transfer; fluid mechanics; regulation and licensing for high temperature reactors, principally designs that use liquid fluoride salts as coolants. Website: http://www.nuc.berkeley.edu/people/per-peterson

Raluca O. Scarlat, Associate Professor and Vice Chair for Undergraduate Matters [scarlat@berkeley.edu] Ph.D., Nuclear Engineering, University of California, Berkeley, 2012. Chemical and thermophysical characterization of high-temperature molten salts and other inorganic fluids, and heat and mass transport pertaining to energy systems. Electrochemistry, corrosion, thermodynamics. Nuclear reactor safety analysis, licensing and design, and engineering ethics. Website: https://salt.nuc.berkeley.edu/

Daniel Siefman, Assistant Professor [daniel.siefman@berkeley.edu] Ph.D., Nuclear Engineering, École polytechnique fédérale de Lausanne, 2019. Critical and subcritical experiments and methods; nuclear data validation and adjustment; computational methods in radiation transport; neutron noise; reactor dosimetry; design optimization and safety analysis of reactors with machine learning.
Website: https:// nuc.berkeley.edu/people/daniel-siefman/

Guanyu Su, Assistant Professor [gysu@berkeley.edu] Ph.D., Nuclear Science and Engineering, MIT, 2018. Heat and mass transfer in high temperature molten salt technology; high temperature thermal storage for advanced energy systems; diagnostic tools and distributed wireless sensors; machine learning applications in reactor simulation and plant health monitoring.
Website: https://heat.nuc.berkeley.edu/

Eleanor Tubman, Assistant Professor [e.r.tubman@berkeley.edu] Ph.D., University of York, 2016. Generation of magnetic fields within fusion conditions; production of collision less shock waves; methods to measure electromagnetic fields.

Karl A. van Bibber, Shankar Sastry Chair for Leadership and Innovation & Professor and Shankar Sastry Chair for Leadership and Innovation (510-642-3477) [karl.van.bibber@nuc.berkeley.edu] Ph.D., Massachusetts Institute of Technology, 1976. Nuclear Physics; Particle Physics; Particle Astrophysics; Nuclear Instrumentation; Accelerator Science & Technology.
Website: http://www.nuc.berkeley.edu/ people/karl-van-bibber

Other Faculty

Ehud Greenspan, Professor of the Graduate School (510-643-9983) [gehud@nuc.berkeley.edu] Ph.D., Cornell University, 1966. Generation IV reactors - conception and analysis of advanced nuclear reactors; Transmutation - minimization of nuclear waste as well as the disposition of nuclear waste and the closing of the nuclear fuel cycle; Advanced fuel cycles for improving proliferation resistance and nuclear fuel utilization; as well as development of automated nuclear design optimization methods and their application in the areas of criticality safety, boron neutron capture therapy, radiation shields, and fusion energy systems. Website: http://www.nuc.berkeley.edu/people/ehud-greenspan

Daniel M. Kammen, Professor (510-643-2243) [kammen@socrates.berkeley.edu] Ph.D., Princeton University, 1988. Science and technology policy focused on energy, development and environmental management; Technology and policy questions in developing nations, particularly involving: the linkages between energy, health, and the environment; technology transfer and diffusion; household energy management; renewable energy; women; minority groups; Global environmental change including deep cuts in greenhouse gas emissions and resource consumption; Environmental and technological risk; Management of innovation and energy R&D policy. Geographic expertise: Africa; Latin America.
Website: http://www.nuc.berkeley.edu/people/daniel-kammen

William E. Kastenberg, Professor Emeritus [kastenbe@nuc.berkeley.edu] Ph.D., UC Berkeley, 1966. Ethical issues in emerging technologies, risk assessment and risk management for technological and natural complex systems, nuclear reactor safety, environmental risk analysis, environmental conflict resolution. Website: http://www.nuc.berkeley.edu/people/bill_kastenberg

Ka-Ngo Leung, Professor of the Graduate School (510-486-7918) [knleung@lbl.gov] Ph.D., UCLA, 1975. Plasma and Ion Beam technology in microfabrication processes: maskless ion beam lithography technology as candidates for next generation lithography (NGL) that will be used to produce feature sizes of 100 nm and below; focused ion beam (FIB) systems equipped with plasma ion sources; compact neutron tube with rf plasma ion source. Website:http://www.nuc.berkeley.edu/people/ka-ngo-leung

Edward C. Morse, Professor (510-642-7275) [morse@nuc.berkeley.edu] Ph.D., University of Illinois, Urbana-Champaign, 1979. Fusion reactor design and applied plasma physics, experimental investigation of RF plasma heating; rotating target neutron source at UC Berkeley; experimental studies of compact toroids; a spectral method for magnetohydrodynamic stability.
Website: http://www.nuc.berkeley.edu/ people/edward-morse

Eric B. Norman, Professor of the Graduate School (510-643-9984) [ebnorman@lbl.gov] Ph.D., University of Chicago, 1978. Developing active neutron-based interrogation system to screen sea-going cargo containers for fissionable material; Cryogenic Underground Observatory for Rare Events (CUORE) – a planned large- scale bolometric detector designed to search for the neutrinoless double beta decay of 130Te; Measurements of neutron and charged-particle induced reaction cross sections for homeland security, nuclear astrophysics, and neutrino physics.
Website: http://www.nuc.berkeley.edu/people/eric-norman

Carl Schroeder, Adjunct Professor (510-486-4723) [cbschroeder@berkeley.edu] Ph.D., University of California, Berkeley, 1999. Interests include intense laser-plasma and beam-plasma interactions, plasma-based accelerators, advanced acceleration concepts, novel radiation sources, free-electron lasers, and related topics. Website: https://nuc.berkeley.edu/people/carl-schroeder/

Youngho Seo, Professor in Residence (415-353-9464) [yseo@berkeley.edu] Ph.D., University of California, Los Angeles, 2002. Primary research focus is to use quantitative SPECT/CT, PET/CT, and PET/MR molecular imaging tools for a broad range of research areas from small animal imaging using dedicated animal imaging systems and basic instrumentation development to physics analysis of clinical research data. Website: https://radiology.ucsf.edu/physics & https://nuc.berkeley.edu/people/youngho-seo/

Kai Vetter, (510-642-7071) [kvetter@nuc.berkeley.edu] Ph.D., J. W. Goethe-University, Frankfurt, 1995. Development and demonstration of new and/or improved gamma-ray (and neutron) imaging concepts for applications ranging from homeland security and nuclear non-proliferation to biomedical imaging; search for neutrino-less double-beta decay in 76Ge to obtain better understanding on fundamental properties of neutrinos to answer fundamental questions; developing and demonstrating new and improved concepts in Ge detector technologies to provide unprecedented capabilities in observing rare decays or rare interactions; basic nuclear physics experiments and associated instrumentation to better understand the basic structure of nuclei. Website: http://www.nuc.berkeley.edu/people/kai-vetter

Jasmina L. Vujic, Professor (510-643-8085) [vujic@nuc.berkeley.edu] Ph.D., University of Michigan, 1990. Numerical methods in reactor physics, neutron and photon transport, reactor core design and analysis, shielding and radiation protection, biomedical application of radiation, optimization techniques for vector and parallel computers: neutronics analysis of fissile material behavior in geologic repositories; computer modeling for radiation diagnostic and cancer therapy; development of multiprocessor Mult assembly neutron transport theory code; development and validation of the GT-SCALE code package for advanced reactor core designs; development of a unified multidimensional computational method for neutral particles in complex non-uniform domains. Website: http://www.nuc.berkeley.edu/people/jasmina-vujic

Haruko Wainright, Associate Adjunct Professor (510-847-0036) [HMWainwright@lbl.gov] Ph.D., University of California, 2010. Environmental remediation at nuclear contaminated sites; regional-scale radiation monitoring; groundwater remediation and long-term monitoring; radionuclide transport modeling; uncertainty quantification and parameter estimation; Bayesian geostatistical methods; geospatial ecological mapping and modeling. Website: https://eesa.lbl.gov/profiles/haruko-murakami-wainwright/

Nuclear Science and Engineering Research Centers

Nuclear Science and Security Consortium (NSSC): The NSSC is a consortium of seven major research universities and five DOE national laboratories, of which UC Berkeley is the lead institution. Funded by the DOE Office of Non-Proliferation ($25M/5 years), the purpose of the NSSC is to reinvigorate the pipeline of scientific, engineering and policy talent into the national laboratories and federal service in national security. Primarily the Consortium is intended to fund undergraduate, graduate student and postdoctoral research, introducing and connecting this talent with participating DOE labs. The NSSC supports research across the entire spectrum of relevant disciplines, including nuclear and particle physics, nuclear instrumentation and radiation detection, nuclear- and radiochemistry, nuclear engineering, and nuclear security international policy and programs. Additionally, NA-22 has expanded and augmented the program to include solicitations for research grants and internships to Minority Serving Institutions (MSI) as well.

Applied Nuclear Physics Laboratories: These labs are concerned with the low-energy nuclear physics and interaction of radiation with matter important to nuclear chemistry, nuclear technology and applications. Research programs include fundamental nuclear physics measurements for applied purposes and the development of advanced detectors and methodologies, in addition to the application of nuclear techniques in a wide range of studies. Current emphasis is on experimental and modeling studies in support of neutrino mass measurements, the design of methodologies and systems to counter the possible transport of clandestine nuclear materials and applications in the biomedical and radiological sciences.

Detection Laboratory: Kelp Watch (http://kelpwatch.berkeley.edu/) and Rad Watch. Additional Research Areas: Computational Methods, Nonproliferation, Risk, Safety, and Large-Scale Systems Analysis, Ethics and the Impact of Technology on Society, Energy Systems and the Environment, Bio nuclear and Radiological Physics, Laser, Particle Beam, and Plasma Technologies Plasma and Fusion Science and Technology

Nuclear Materials Laboratory: This lab uses thermogravimetric techniques with microbalances to investigate the hydrating and oxidation of nuclear reactor core materials and positron annihilation spectroscopy to characterize the microstructural changes in irradiated structural steels. In addition to understanding the performance of nuclear fuels and materials in current nuclear fission plants, the material aspects of new fuel element designs and advanced nuclear fuels and structural material systems are investigated. The lab is devoted to understanding the many causes of materials degradation and failure in nuclear technology. Specific emphasis is on the behavior of nuclear fuels, cladding and structural materials in nuclear fission and fusion environments where radiation damage and corrosion are the overarching concerns. This research combines computational, experimental and theoretical techniques to investigate the dynamic response of nuclear materials.

Nuclear Waste and Fuel Cycle Laboratory: The lab focuses on performance assessment of nuclear and radioactive waste management. Research topics include (1) mass-flow analyses in the nuclear fuel cycle to quantify compositions and quantities of wastes from various concepts of fuel cycles, ranging from reactors, separation processes, and waste stabilization processes, (2) performance assessment of geological disposal for various different waste forms and repository concepts and designs, ranging from shallow-land burial for low and intermediate level wastes, mined repository for spent nuclear fuels and high-level wastes, and most recently deep borehole disposal for separated long-lived iodine, and (3) development of integrated performance assessment systems covering both the fuel cycle and the geological disposal. After the Fukushima accident, the criticality safety for geological disposal of molten corium and accumulated plutonium has emerged as an important topic.

Nuclear Science User Facility Partner Institution: UCB-NE's department is a NSUF partner facility providing facilities to the NE community as a whole. SEM/FIB/EBSD/EDS for active and non-active samples is available as well as nanoindentation, (insitu and ex-situ) as well as Helium Ion Beam Microscopy, cryand heating capability, macroscale tensile testing on active and non-active samples as well as heat treatments and sample preparation. All facilities are available through the NSUF user facility access process.

Thermal Hydraulics Laboratory: The UCB Thermal Hydraulics Laboratory studies heat transfer and fluid mechanics phenomena that are relevant to fission and fusion energy systems. A principal focus of the laboratory is on the development of and experimental validation of models for passive safety systems. Experimental work in the laboratory has investigated effects of incondensable on condensation in passive light water reactor containments, large-scale mixing processes in reactor containments and high level waste tanks, coolant fluid mechanics for inertial fusion energy chambers, convective heat transport for high Prandtl number fluids simulating the behavior of fluoride salts, pebble bed granular flows, and other phenomena. The laboratory has extensive capabilities for quality assurance, instrumentation and data acquisition, and modeling and simulation.

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	11	15	15
Masters	7	0	5
Ph.D.	2	2	2

Number of Graduates

Graduate Student Enrollment: Masters/ Ph.D.
ABET Accreditation: Nuclear Engineering(BS)

Nuclear Science and Engineering Faculty

Andreas Enqvist, Nuclear Engineering Program Director and Associate Professor (352-294-2177) [enqvist@mse.ufl.edu] Ph.D., Chalmers University of Technology, Sweden, 2010. Nuclear safeguards; detection statistics of radiation from fissile materials and the physics behind particle-detector interactions; neutron physics & detectors; neutron noise signals; radiation signal analysis, Data Fusion and Machine Learning. Website: http://enqvist.mse.ufl.edu

James Baciak, Professor (352-273-2131) [jebaciak@mse.ufl.edu] Ph.D., University of Michigan,2004**.** Radiation measurements; radiation detector development; new radiation detector materials; detector testing and characterization for gamma-ray spectroscopy; environmental monitoring;non-proliferation and treaty verification; nuclear security. Website: http://mse.ufl.edu/people/name/james-baciak/

Assel Aitkaliyeva, Associate Professor (352-846-3778) [aitkaliyeva@mse.ufl.edu] Ph.D., Texas A&M, 2012. nuclear materials; thermal and mechanical properties; radiation damage; radiation effects. Website: http://manatee.mse.ufl.edu

Kyle Hartig, Assistant Professor (202-270-4721) [hartig@mse.ufl.edu] Ph.D., Pennsylvania State University. Remote Sensing, Nuclear Nonproliferation/counterproliferation, Nuclear Security, and Nuclear Policy.

Christopher McDevitt, Associate Professor (352-846-3785) [cmcdevitt@ufl.edu] Ph.D., University of San Diego at California, 2008. Magnetic Fusion; Plasma Physics; Plasma Turbulence; Scientific Machine Learning; Runaway Electron Formation; Monte Carlo Methods. Website: https://mcdevitt.mse.ufl.edu/

Michael Tonks, Professor (352-846-3779) [michael.tonks@ufl.edu] Ph.D., University of Illinois, Urbana-Champaign, 2008. Computational nuclear materials, reactor fuel performance, computational materials science, computational mechanics. Website: http://tonks.mse.ufl.edu/

Nathalie A. Wall, Professor and Interim Director (352-273-0279) [Nathalie.Wall@ufl.edu] Doctorate, University of Paris, France, 1993. Radiochemistry; environmental behavior of radio nuclides; nuclear forensics. Website: https://faculty.eng.ufl.edu/wall-research/

Justin Watson, Associate Professor (352-273-0241) [justin.watson@ufl.edu] Ph.D., The Pennsylvania State University, 2010. Advanced Reactor Physics Methods, Nuclear Thermal and Electric Propulsion, Numerical Methods for Multiphysics Simulations, Machine Learning and High-Performance computing. Website: watson.mse.ufl.edu

Yong Yang, Associate Professor (352-846-3791) [yongyang@ufl.edu] Ph.D.**,** University of Wisconsin-Madison**,** 2005**.** Nuclear reactor materials; materials degradations; corrosion; radiation damage; additive manufacturing; non-destructive evaluation Website: http://manatee.mse.ufl.edu/

Other Faculty

Wesley E. Bolch, Distinguished Professor (352-273-0303) [wbolch@ufl.edu] Ph.D., University of Florida, 1988. Computational dosimetry, medical physics, external dosimetry, internal dosimetry

David Gilland, Associate Professor of Biomedical Engineering (352-273-0302) [gilland@ufl.edu]Ph.D., University of North Carolina at Chapel Hill, 1989. Molecular imaging, instrumentation and algorithm development using PET and SPECT.

Ira Harkness, Instructional Assistant Professor (352-846-3329) [ira@mse.ufl.edu] Ph.D., University of Florida, 2018. Monte Carlo methods; neutron transport; nuclear safeguards; nonproliferation; engineering education.

Jyothier Kumar Nimmagadda, Research Assistant Scientist (352-294-2102) [jyothir@ufl.edu] Ph.D., Idaho State University, 2015. Reactor Physics Experiments; Non-destructive radiation imaging; Monte-Carlo Methods; Pre and Post Irradiation Analysis; Medical Imaging; Radiation Detection.

Juan C. Nino, Professor of Materials Science and Engineering (352-846-3787) [jnino@mse.ufl.edu] Ph.D., The Pennsylvania State University, 2002. Multifunctional ceramics; energy materials; dielectrics and ionic conductors in bulk and thin film; single crystal growth; nuclear materials and detectors; bioceramics.

Simon Phillpot, Distinguished Professor and Vladimir A. Grodsky Professor (352-846-3782) [sphil@mse.ufl.edu] Ph.D., University of Florida, 1985. phonons and thermal transport; microstructure; clays, wasteforms; mechanical properties; radiation effects; intercalation; atomic resolution simulation methods List areas separated by semi-colons.

DuWayne Schubring, Instructional Associate Professor and NE Undergraduate/ABET Coordinator (352) 294-7870 [dlschubring@ufl.edu] Ph.D., University of Wisconsin-Madison, 2009. Two-phase flow (esp. annular flow), reactor thermal hydraulics, liquid metal fast-spectrum reactors, and nuclear engineering education/accreditation.

James S. Tulenko, Professor Emeritus (352-392-1427) [tulenko@ufl.edu] M.S., Massachusetts Institute of Technology, 1963. Nuclear fuel cycle; processing, fabrication and in-core and ex-core performance of nuclear fuel; multi-scale simulation of nuclear fuel; economic and environmental evaluation of all forms of electrical energy generation.

William Vernetson, Adjunct Faculty (retired) (352-392-1401x309) [vernet@ufl.edu] Ph.D., University of Florida, 1978. Reactor safety; reactor operations and training; systems design; probabilistic risk assessment; criticality analysis; neutron activation analysis.

Donald E. Wall, Professor of Practice & Director University of Florida Training Reactor (352-273-2662) [donald.wall@ufl.edu] Ph.D., Florida State University, 2001. Nuclear reactor cooling systems; research reactor operation; actinide and fission product thermodynamics; research reactor operator licensing.

Nuclear Science and Engineering Research Centers

Backscatter Radiography by Selective Detection (RSD) Lab: *Dr. James Baciak*. X-ray backscatter imaging for a wide variety of imaging applications focused on non-destructive testing in aerospace, nuclear facility, roadway/railway infrastructure, and medical applications.

HiperGator: The Department of Research Computing provides comprehensive support for researchers that use HiPerGator, the university supercomputer. HiPerGator is currently ranked as the 136th most powerful supercomputer in the world, and third most powerful among public U.S. universities. UF anticipates acquiring some of the nation's most advanced AI machinery before the end of 2020, through collaboration and donation form Nvidia. **Website:**https://www.rc.ufl.edu/services/hipergator/

Nuclear Fuels & Materials Characterization Facility: Characterization of nuclear fuels and materials, including scanning electron microscope (SEM), focused ion beam (FIB), transmission electron microscope (TEM), energy dispersive spectrometer (EDS), electron backscattering diffraction (EBSD), and in-situ mechanical testing. *Drs. Assel Aitkaliyeva & YongYang*.
Website: https://rsc.aux.eng.ufl.edu/nfmcf/

Optical Science and Remote Sensing Laboratory: The laboratory comprises approximately 1,000 ft^2 of quality laboratory space that is approved for use of radioactive materials and contains state-of-the-art experimental laser sources, plasma diagnostics, and scientific infrastructure. His group and laboratory conduct extensive work on machine learning, X-ray imaging, laser remote sensing of nuclear materials, laser induced plasmas, and chemistry of actinides in plasmas for nuclear forensics, fuel cycle, and security applications. *Dr. Kyle C. Hartig*

Radiochemistry Laboratory: Radioanalytical tools and instrumentations for nuclear fuel cycle applications, including environmental behavior of radionuclides, nuclear forensics, and radiopharmaceutical compounds. *Dr. Nathalie A. Wall.*

Radiation Detection and Nuclear Instrumentation Lab: Provides an opportunity for undergraduate and graduate students in the department to learn about and operate various radiation detectors, detector systems, and their associated electronics. Laboratory space and equipment is also provided for advanced research in radiation detector development. Other non-destructive testing systems are also available for investigative/educational purposes.

Radiation measurement and detection system labs: Labs focused on radiation measurements, radiation detector development; new radiation detector materials; detector testing and characterization for gamma-ray spectroscopy; Radiation -detection interaction measurements, Neutron detector development and characterization, Radiation data Analysis, non-proliferation and treaty verification; nuclear security.
Drs. James E. Baciak & Andreas Enqvist.

Simulation and modelling center: Investigates the co-evolution of microstructure and properties of materials in harsh environments using multiscale modeling and simulation (*Dr. Tonks*). Kinetic simulation of magnetic and inertial confinement fusion plasmas (*Dr. McDevitt*). Coupled multi-scale, multi-physics simulations for design, operation, and safety analysis of light water and Gen IV nuclear power systems (Dr. Watson). Atomic-level simulation of fuel systems and waste forms *(Dr. Phillpot*).

University of Florida Training Reactor (UFTR): A 100 kW Argonaut-class nuclear reactor (plate-fuel, split core) with multiple neutron beam ports and a fast-RABBIT pneumatic tube system, which allows short, on-line irradiations of samples, and rapid withdrawal for measurement. The UFTR is used for training and demonstration.

UNIVERSITY OF IDAHO

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https://www.uidaho.edu/engr/departments/neim

	7/21-6/22	7/22-6/23	7/23-6/24
Masters	9	1	9
PhD	2	5	3

Number of Graduates

Graduate Student Enrollment: 30 Masters/ 25 Ph.D.

Nuclear Science and Engineering Faculty

Indrajit Charit, Professor and Department Chair (208-757-5409) [icharit@uidaho.edu] Ph.D., Missouri University of Science & Technology, 2004. Nuclear structural materials and fuels, radiation effects, high temperature materials, processing-microstructure-properties correlations, advanced manufacturing including additive manufacturing, spark plasma sintering, friction stir welding/processing and pressure resistance welding.

David Arcilesi, Assistant Professor (208-533-8107) [darcilesi@uidaho.edu] Ph.D., The Ohio State University. Thermal sciences, reactor thermal hydraulics, safety.

Robert Borrelli, Associate Professor (208-533-8122) [rborrelli@uidaho.edu] Ph.D., University of California, Berkeley. Safeguards-by-design, fuel cycle analysis, modeling, scientific computing, risk assessment, nuclear hybrid energy system design, fuel cask design and analysis, nuclear system data analytics, cybersecurity.

Robert Hiromoto, Professor (208-757-5452) [hiromoto@uidaho.edu] Ph.D., California State University-Long Beach, 1978. Parallel algorithms, communication protocols for UAV's, secure wireless networks.

Michael McKellar, Assistant Professor (208-757-5431) [mmckellar@uidaho.edu] Ph.D., Purdue University. Modeling of thermal and chemical processes, process heat applications, power conversion with nuclear micro-reactors, heat exchangers.

Krishnan Raja, Professor (208-757-5406) [ksraja@uidaho.edu] Ph.D., Indian Institute of Technology, 1993. Degradation of nuclear structural materials, non-destructive materials evaluation, electrochemistry of molten salt reprocessing.

Dakota Roberson, Associate Professor (208-533-8120) [dakotar@uidaho.edu] Ph.D., University of Wyoming. Power system stability and security, high performance control, renewable energy integration, estimation and detection.

Vivek Utgikar, Professor (208-885-6970) [vutgikar@uidaho.edu] Ph.D., University of Cincinnati, 1993. Hydrogen and energy systems, advanced fuel cycles, energy storage.

Haiyan Zhao, Associate Professor (208-533-8123) [haiyanz@uidaho.edu] Ph.D., Virginia Polytechnic University, 2009. Molten salts/ionic liquids; pyro processing, fuel cycles; waste form; electrochemistry; corrosion; catalysis.

Other Faculty

Matthew Bernards, Associate Professor (208-885-2150) [mbernards@uidaho.edu] Ph.D., University of Washington, 2008. Beta-voltaic micro batteries, biology-material interfacial interactions.

Lee Ostrom, Professor Emeritus [ostrom@uidaho.edu] Ph.D., Texas Technology University, 1988. Nuclear safety, risk assessment, project management, industrial ergonomics.

You Qiang, Professor (208-885-7558) [youqiang@uidaho.edu] Ph.D., Albert Ludwig University Freiburg. Nanomaterials and nanotechnology for nuclear energy; Advanced magnetic separation nanotechnology for spent nuclear fuel recycling; Neutron radiation and instrumentation; Nuclear radiation shielding.

John Russell, Associate Director for Center for Advanced Energy Studies (208-533- 8164) [jtrussell@uidaho.edu] Ph.D., University of Illinois, Chicago. Energy policy; cybersecurity; big data and analytics.

Robert Smith, Professor Emeritus [smithbob@uidaho.edu] Ph.D., New Mexico Mining & Technology. Nuclear waste disposal and management, aqueous biogeochemistry, groundwater contamination remediation, geological carbon sequestration, geothermalenergy.

Nuclear Science and Engineering Research Centers

Center for Advanced Energy Studies – Website: www.uidaho.edu/idahofalls/caes

UNIVERSITY OF ILLINOIS, URBANA-CHAMPAIGN

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	23	27	31
Masters	11	12	12
Ph.D.	11	9	13

Number of Graduates

Graduate Student Enrollment: 16 Masters/ 92 Ph.D.
ABET Accreditation: Bachelor of Science (BS) Degree in Nuclear Engineering

Nuclear Science and Engineering Faculty

Rizwan Uddin, Professor and Department Head (217-244-4944) [rizwan@illinois.edu] Ph.D., University of llinois at Urbana-Champaign, 1987. Reactor thermal hydraulics; computational methods; nuclear reactor theory; homogenization techniques; nuclear engineering education; virtual reality; computational biology; nonlinear dynamical systems. Website: http://verl.npre.illinois.edu

Syed Bahauddin Alam, Assistant Professor (217-300-5835) [alams@illinois.edu] Ph.D., University of Cambridge, 2018. Digital Twin for nuclear systems; Real-time and remote monitoring; Autonomous operations; Explainable, Trustworthy, & Interpretable Machine Learning techniques; Cybersecurity; Uncertainty quantification; MultiCriteria decision-making. Website: https://sbahauddin.tech/

Daniel Andruczyk, Research Associate Professor (217-244-4583) [andruczy@illinois.edu] Ph.D., The University of Sydney-Australia, 2006. Experimental plasma and fusion research; fusion materials; plasma material interaction; plasma facing components; plasma diagnostics; plasma heating.
Website: https://npre.illinois.edu/people/profile/andruczy and https://cpmi.illinois.edu/about-cpmi/

Caleb Brooks, Associate Professor and Donald Biggar Willett Faculty Scholar (217-265-0519) [csbrooks@illinois.edu] Ph.D., Purdue University 2014. Nuclear thermal hydraulics and reactor safety; boiling heat transfer; modeling and experiment of multiphase flows; multiphase flow instrumentation; microreactors. Website: https://mtdl.npre.illinois.edu/ and https://npre.illinois.edu/research/microreactor-rdd-center

Davide Curreli, Professor and Donald Biggar Willett Faculty Scholar (217-300-1787) [dcurreli@illinois.edu] Ph.D., University of Padova, Italy, 2011. Plasma modeling using fluid and kinetic models; plasma-material interactions; plasma sources; transport phenomena in plasmas.
Website: https://npre.illinois.edu/people/profile/dcurreli and https://curreli.npre.illinois.edu/

Angela Di Fulvio, Associate Professor (217-300-3739) [difulvio@illinois.edu] Ph.D., University of Pisa, Italy, 2012. Neutron detection, spectroscopy, dosimetry, and imaging; detection systems and inference algorithms for safeguards and nonproliferation applications; measurement-aided artificial intelligence clinical decision support. Website: https://nmlab.npre.illinois.edu/

Brent J. Heuser, Professor (217-333-9610) [bheuser@illinois.edu] Ph.D., The University of Michigan, 1990. Neutron detection, spectroscopy, dosimetry, and imaging; detection systems and inference algorithms for safeguards and nonproliferation applications; measurement-aided artificial intelligence clinical decision support. Website: https://publish.illinois.edu/h-lab-npre/

Kathryn D. Huff, Blue Water Associate Professor (217-333-3132) [kdhuff@illinois.edu] Ph.D., University of Wisconsin-Madison, 2013. Development of modeling and simulation tools for advanced nuclear reactors and fuel cycles; coupled multi-physics simulation; open & reproducible scientific computing; data science applications in nuclear energy. Website: https://github.com/arfc and https://arfc.npre.illinois.edu/

Tomasz Kozlowski, Professor and Associate Head for Undergraduate Programs (217-333-4096) [txk@illinois.edu] Ph.D., Purdue University, 2005. Reactor physics and thermal-hydraulics; reactor design and safety analysis; multi-physics methods and modeling; numerical analysis and computational methods. Website: https://arts.npre.illinois.edu/

Leon Liebenberg, Teaching Professor (217-300-5496) [leonl@illinois.edu] Ph.D., University of Johannesburg, 2001. Energy sustainability; Mass communication of sustainability; Demand-side management; Heat transfer enhancement; Pedagogies of engagement; Emotional learning strategies; Entrepreneurial thinking and design thinking to enhance curricula. Website: https://npre.illinois.edu/people/profile/leonl

Ling-Jian Meng, Professor (217-333-7710) [ljmeng@illinois.edu] Ph.D., University of Southampton-United Kingdom, 2001. Advanced radiological imaging for diagnosing and therapeutics for some of the most pressing diseases, such as cancer, cardiovascular diseases, and neural degenerative disorders. The Meng lab specializes in high-performance semiconductor imaging sensors, Positron Emission Tomography (PET), Single Photon Emission Computed Tomography (SPECT), and functional X-ray CT instrumentations.
Website: http://radimg.npre.illinois.edu

Zahra Mohaghegh, Associate Professor and Donald Biggar Willett Faculty Scholar (217-300-5076) [zahra13@illinois.edu] Ph.D., University of Maryland, College Park, 2007. Socio-Technical Risk Analysis; probabilistic risk assessment for conventional power plants and advanced nuclear reactors; probabilistic physics-of-failure analysis; human-system reliability modeling; uncertainty quantification; risk-informed policymaking for the safety and economic viability of complex technological systems.
Website: https://npre.illinois.edu/people/profile/zahra13

April Novak, Assistant Professor (217-300-5822) [ajnovak2@illinois.edu] Ph.D., University of California, 2020. Computational thermal-hydraulics, multiscale and multiphysics methods, Monte Carlo transport, high performance computing, reactor design. Website: https://npre.illinois.edu/people/profile/ajnovak2

Dren Qerimi, Research Assistant Professor and Associate Director for the Illinois Plasma Institute (217-265-5135) [dqerimi@illinois.edu] Ph.D., University of Illinois at Urbana-Champaign, 2021.
Semiconductor Processing including etching, deposition and EUV lithography. Atmospheric-pressure plasmas for material synthesis. Website: https://ipi.illinois.edu/

Magdi Ragheb, Associate Professor (217-333-6569) [mragheb@illinois.edu] Ph.D., University of Wisconsin, 1978. Computational methods; radiation protection and shielding; probabilistic risk assessment; applied artificial intelligence; supercomputing. Website: http://mragheb.com/

R. Mohan Sankaran, Donald Biggar Willett Professor and Associate Head for Graduate Programs (217-244-7316) [rmohan@illinois.edu] Ph.D., California Institute of Technology, 2004. Low-temperature, atmospheric-pressure plasmas; plasma synthesis of nanoparticles; plasma-liquid electrochemistry; plasma synthesis of chemicals; plasma-assisted additive methods to thin-film fabrication.
Website: https://speclab.npre.illinois.edu/

James F. Stubbins, Donald Biggar Willett Professor (217-333-6474) [jstubbin@illinois.edu] Ph.D., University of Cincinnati, 1975. Japan WPI International Institute on Carbon Neutral Energy Research; development, analysis and application of materials, primarily for energy-related applications; nuclear systems design and analysis; nuclear materials; irradiation damage and effects, mechanical properties; high temperature corrosion; electron microscopy; energy analysis and policy. Professional Engineer.

L Vergari, Assistant Professor (217-300-6605) [vergari@illinois.edu] Ph.D., University of California, Berkeley, 2023. Chemistry of coolants and blankets for advanced fission and fusion reactors, molten salt chemistry and corrosion, interactions with ceramics and metals, irradiation effects, transport of isotopes, electrochemistry, data science applications to materials characterization.
Website: https://publish.illinois.edu/blanketsandcoolants/

Jianqi Xi, Assistant Professor (217-300-6494) [jianqixi@illinois.edu] Ph.D., University of Tennessee-Knoxville, 2017. Applying integrated multiscale models and experimental techniques to the study of radiation & corrosion degradations of nuclear materials, as well as employing machine learning approaches to the design of nuclear materials.
Website: https://publish.illinois.edu/modeling-nuclear-materials/

Other Faculty

Shiva Abbaszadeh, Adjunct Associate Professor (217-300-2542) [sabbasza@illinios.edu] Ph.D., University of Waterloo, Canada, 2014. Radiation detection and instrumentation for molecular imaging; biomedical devices and sensors; data acquisition and readout electronics; computational problem solving; quantitative characterization of biological processes.

John R. Abelson, Affiliate Professor Emeritus (217-333-7258) [abelson@illinois.edu] Ph.D. Stanford University, 1987. Chemical vapor deposition of coatings using novel precursors to afford metals, oxides, nitrides, and borides for extreme environments. Surface mechanisms leading to superconformal growth, ultra-smoothness, and filling of deep features.
Website: http:// www.matse.illinois.edu/directory/profile/abelson

Jont B. Allen, Affiliate Professor (217-369-7711) [jontalle@illinois.edu (alt: jontallen@ieee.org)] Ph.D., The University of Pennsylvania, 1970. Cochlear modeling; middle ear modeling; mathematical physics; Solar desalination of sea water. Website: http://auditorymodels.org/

Stephen Boppart, Affiliate Professor (217-244-7479) [boppart@illinois.edu] Ph.D., Massachusetts Institute of Technology, 1998; M.D., Harvard Medical School, 2000. Optical diagnostics of cancer; medical engineering; image-guided surgery; optical coherence tomography; lasers in medicine and biology; optical biomedical imaging. Website: http://biophotonics.illinois.edu/

Paul T. Debevec, Affiliate Professor Emeritus (217-333-0285) [debevec@illinois.edu] Ph.D., Princeton University, 1972. Precision measurements of fundamental properties of the muon as a search for physics beyond the Standard Model. Website: https://physics.illinois.edu/people/directory/profile/debevec

Thomas J. Dolan, Adjunct Professor (217-333-2295) [dolantj@illinois.edu] Ph.D., University of Illinois at Urbana-Champaign, 1970. Nuclear fusion technology; molten salt fission reactors; thorium energy; low energy nuclear reactions.

Matthias Grosse Perdekamp, Affiliate Professor (217-333-6544) [mgp@illinois.edu] Ph.D., University of California, Los Angeles, 1995. Research interest in studying the properties and dynamics of the quark gluon plasma (QGP) produced in the collisions of large nuclei at the Relativistic Heavy Ion Collider (RHIC) at BNL and the Large Hadron Collider (LHC) at CERN; measurements of proton-nucleus and proton-proton collisions both as reference systems for nucleus-nucleus collisions and as a place to look for the color glass condensate; measurements of transverse momentum dependent nucleon spin structure using COMPASS (COmmon Muon Proton Apparatus for Structure and Spectroscopy) at CERN; development of Zero Degree Calorimeters (ZDCs) and Reaction Plane Detectors (RPDs) for the high radiation environment in the LHC tunnel. Website: https://npre.illinois.edu/people/profile/mgp

Timothy P. Grunloh, Principal Research Scientist (217-244-1504) [tgrunloh@illinois.edu] Ph.D., University of Michigan, 2016. Advanced reactors and applications integrated nuclear systems, computational fluid dynamics, reduced order modeling. Website: https://npre.illinois.edu/people/profile/tgrunloh

Brian E. Jurczyk, Adjunct Research Assistant Professor (217-721-4165) [bjurczyk@starfireindustries.com] Ph.D., MBA, University of Illinois at Urbana-Champaign, 2003. Area 1: High power impulse magnetron sputtering deposition and etching; atmospheric-pressure and low-pressure surface microwave plasmas; plasma-enhanced chemical vapor deposition and atomic layer processes; advanced thin-film materials development; Area 2: Compact particle accelerators for neutron generation & imaging; gamma-ray spectroscopy & elemental analysis; non-destructive inspection; x-ray and e-beam generation. Website: http://www.starfireindustries.com

Michael D. Robledo Kaminski, Adjunct Professor (217-333-2295) [mdkamins@illinois.edu] Ph.D., University of Illinois at Urbana-Champaign, 1998. Research interests in radiochemistry; radioactive materials separations technologies; radiological decontamination; radiological and nuclear threat mitigation; spent nuclear fuel separations; nuclear materials analysis and security applications; pre and post detonation analysis; magnetic based separations; nano-magnetic materials; drug delivery vectors; portable CBRN detection systems.

Ernie J. L. Kee, Research Associate Professor (217-333-2295) [erniekee@illinois.edu] B.S., University of Idaho, 1978. Research interests in light water reactor risk assessment, operations, research, performance evaluation, and maintenance; operations in the US Navy; thermal-hydraulic analysis at INL LOFT experimental facility; fuel thermalhydraulic analysis EXXON Nuclear; South Texas Project Nuclear Operating Company; dynamic thermal- hydraulics analysis with RELAP5 and TRAC; commercial nuclear reactor Shift Technical Advisor; generation risk assessment; unit reactor engineer reactor management surveillance testing; emergency response organization technical support center nuclear engineer; fuel reliability engineer; reactor power calorimetry analysis and uncertainty management.

Kyekyoon Kim, Affiliate Professor (217-333-7162) [kevinkim@illinois.edu] Ph.D., Cornell University, 1971. Tailored organometallic, Sol-Gel processing, charged liquid cluster beam deposition and chemical vapor deposition; controlled fabrication of thin films, nanofibers, and nanoparticles using charged liquid cluster beams of precursor solutions; fabricating micro and nanoscale structures for development of new devices and material systems for controlled release, lighting, display, solar cells, photosensors, and power storage; fabricating uniform micro and nano spheres and capsules of biodegradable and biocompatible materials for advanced drug delivery and cell-based therapy; development of high power electronic devices based on III-V Nitride semiconductors using plasma assisted molecular beam epitaxy and selective area growth technology. Website: http://tfcp.ece.illinois.edu/index.htm

George H. Miley, Professor Emeritus (217-356-5402) [ghmiley@illinois.edu] Ph.D., The University of Michigan, 1959. Fusion systems; plasma engineering; reactor kinetics; high voltage technology; nuclear pumped lasers; direct energy conversion; hydrogen energy production; low-energy nuclear reactions in solids. Professional Engineer. Website: http://fsl.npre.illinois.edu

David W. Miller, Adjunct Assistant Professor (217-855-3238) [dmiller@illinois.edu] Ph.D., Purdue University, 1976. Occupational dose reduction at nuclear power plants; colloidal source term removal and mitigation studies in primary coolant at light water reactors; tritium recapture modeling at pressurized water reactors; UNSCEAR US effluent databases and analysis; radiological work management research at nuclear power plants; medical shielding validation studies; ACCESS relational database development for dose trend analysis.

Martin J. Neumann, Adjunct Assistant Professor (217-840-5490) [martin@mjneumann.com] Ph.D., University of Illinois at Urbana-Champaign, 2007. EUVL related technologies; semiconductor fabrication and processing and plasma-material interactions related to fusion applications.

Seyed A. Reihani, Senior Research Scientist (217-300-5077) [sreihani@illinois.edu] Ph.D., University of Maryland, College Park, 2005. Incorporating Physical Phenomena into Risk Models; Risk-Informed Designs; Application of Catalytic Combustion in Power Generation Systems; Modeling and Analysis of Fuel Cell Systems. Website: https://soteria.npre.illinois.edu/

William R. Roy, Adjunct Professor (217-840-9769) [wroy@illinois.edu] Ph.D., University of Illinois at Urbana-Champaign, 1985. Radioactive and hazardous waste management; decommissioning and environmental restoration; public policy and perception; author of Radioactive Waste Management in the 21st Century (2021) ISBN 978-981-122-829-2.

David N. Ruzic, Professor Emeritus and Director of the Illinois Plasma Institute (217-333-0332) [druzic@illinois.edu] Ph.D., Princeton University, 1984. Experimental fusion research especially the use of lithium as a plasma-facing component; plasma- material interactions; plasma processing of semiconductors; atmospheric-pressure plasmas for industrial processing and material creation; extreme ultraviolet (EUV) sources for lithography; physical and chemical vapor deposition especially high-powered impulse magnetron sputtering (HIPIMS); plasma diagnostics and plasma sources.
Website: http://cpmi.illinois.edu and https://ipi.illinois.edu/

Clifford E. Singer, Emeritus Professor (217-333-1814) [csinger@illinois.edu] Ph.D., University of California, Berkeley, 1971. Advanced spacecraft propulsion systems; spent nuclear fuel management; nuclear proliferation; energy systems analysis; and energy econometrics. Website: http://npre.illinois.edu

Michael Stowell, Jr., Adjunct Research Associate Professor, Chief Innovation Officer, Lyten Inc. [mstowell@illinois.edu] Atmospheric pressure plasmas, material synthesis, composite materials, 3-D graphene. Website: http://lyten.com

Robert A. Stubbers, Adjunct Research Assistant Professor (217-333-2295) [rstubbers@starfireindustries.com] Ph.D., University of Illinois at Urbana-Champaign, 1994. Plasma innovations for aerospace; defense, industrial, instrumentation, medical; semiconductor applications. Website: http://www.starfireindustries.com

Dallas Trinkle, Affiliate Professor (217-244-6619) [dtrinkle@illinois.edu] Ph.D., The Ohio State University, 2003. Computational materials science: atomistics, electronic structure; mechanical behavior: plasticity and phase transformation at atomistic scale; defect properties: point defects, dislocations, interfaces; transport: interstitial diffusion, vacancy-mediated diffusion.
Website http://dtrinkle.matse.illinois.edu/dokuwiki/doku.php

Yang Zhang (YZ), Adjunct Professor (217-300-0452) [zhyang@illinois.edu] Ph.D., Massachusetts Institute of Technology, 2010. Non-equilibrium physics and accelerated molecular simulations (long timescale phenomena, rare events, irreversibility, randomness); Physics and chemistry of liquids and complex fluid, especially under interfacial/non-equilibrium/extreme conditions (water, metallic liquids, molten salts, ionic liquid, electrolyte solutions); Neutron scattering, sources, and instrumentation); soft robotic sand human-compatible machines; Robots in extreme environments; Understandable artificial intelligence.
Website: http://z.engineering.illinois.edu

Nuclear Science and Engineering Research Centers

The **Advanced Blankets & Coolants (ABC) Laboratory,** directed by Assistant Professor L Vergari, carries out experimental research on high-temperature liquids with a mission to develop the new generation of coolants for advanced fission reactors and of breeding blankets for fusion reactors.
Website: https://abc.npre.illinois.edu

The **Advanced Reactors and Fuel Cycles,** directed by Associate Professor Kathryn Huff, seeks to advance the safety and sustainability of nuclear energy production through improved reactor designs, fuel cycle strategies, and waste management techniques. We achieve this by advancing computational methods and developing software for nuclear engineering with features essential to advanced reactor multiphysics modeling and fuel cycle simulation. Website: https://arfc.npre.illinois.edu

The **Analysis of Reactor Transients and Stability Research Center,** directed by Professor Tomasz Kozlowski, performs deterministic safety analysis by developing and validating advanced methods to accurately determine reactor safety margins and reactor behavior. By performing high-fidelity
numerical predictions of the reactor behavior in abnormal transient scenarios of safety significance, our work supports the nuclear reactor safety analysis and increases the fidelity of primary system simulation. This approach is at the heart of nuclear power's excellent safety record-always striving to improve current tools and methods. Website: https://arts.npre.illinois.edu

The **Center for Plasma Material Interactions (CPMI),** directed by Professor David Ruzic, objective is to study plasma material interactions relevant to fusion, semiconductors, plasma manufacturing, and plasma nanosynthesis through a combination of computational and experimental means. Projects are supported by both government and commercial partners to further the application and knowledge of plasma physics. Facilities include HIDRA: the Hybrid Illinois Device for Research & Applications, which is a major-scale stellarator and/or tokamak. HIDRA will be used for testing plasmamaterial interactions, liquid lithium technologies, nanosynthesis and electron transport. Mock-up Entry Module for EAST (MEME) which is a major facility for development of plasma facing components and liquid metal technology allowing for plug and play systems to be built for EAST and other devices. Website: https://cpmi.illinois.edu

The **Functional X-ray Imaging Laboratory (FXIL),** directed by Professor Ling-Jian Meng, is an extensively equipped experimental facility dedicated to the development of functional X-ray imaging techniques, such as X-ray fluorescence Emission Tomography (FXET), X-ray Luminescence Computed Tomography (XLCT), and the study of physical, chemical and biological mechanisms underlying the interaction of ionizing radiation with matter and ways to activate, modulate and mediate the delivery of radiotherapy and to facilitate the control over fundamental biological processes in living mechanisms. Website: https://radimg.npre.illinois.edu

The **High Temperature Nuclear Material Laboratory (HTNML),** directed by Professor James Stubbins, objective is to study nuclear material relevant to microstructure, properties, performance, and interactions with irradiation through microscopy, x-ray analysis, experimental approaches, and modeling for light water reactor, and advanced nuclear reactor. Material studied in this lab includes structural material: copper alloys, nickel-based alloys, stainless/austenitic/ferritic/ ODS steel, zirconium alloy, silicon-carbide composites, and fuel material: uranium dioxide, and cerium dioxide. Frederick Seitz Materials Research Laboratory (FS-MRL) in UIUC provides variety of analytical techniques. NSUF program supports activities of post irradiation examination (PIE). State-of-the-art characterization technologies such as IVEM, APS, and ATP enhance research progress via tight coloration with ANL, ORNL and INL. Projects are supported by Department of Energy (DOE) to further application and knowledge of nuclear material at elevated temperature. Facilities includes in situ biaxial creep-fatigue system which is capable of dynamic measurement of tubular specimen's dimension change under high temperature creep-fatigue test. Website: http://materials.npre.illinois.edu

The **Hybrid Illinois Device for Research and Applications (HIDRA)** is the former WEGA stellarator that was housed at the Max-Planck Institute for Plasma Physics in Greifswald. It is predominantly run as a 5-period, $l = 2$, $m = 5$ classical stellarator but also has the capabilities to run as a tokamak. It is housed at the Center for Plasma Material Interactions (CPMI) and is used to do basic plasma material interaction experiments, material studies and liquid metal technology development. It was brought to Illinois in 2014. HIDRA has become the keystone in the NPRE and UIUC fusion research programs.

The **Illinois Microreactor RD&D Center,** directed by Associate Professor Caleb Brooks, is focused on enabling a paradigm shift in safe deployment of nuclear power. Current research activities in this Center include microreactor modeling and simulation, siting analysis, market analysis, instrumentation, operations and reactor control, licensing, and policy. Website: https://npre.illinois.edu/research/microreactor-rdd-center.

The **Illinois Plasma Institute (IPI),** directed by Professor David Ruzic, objective is to do translational research between industry and the University working at TRL-5 and TRL-6 – putting successful university research directly into industrial projects. IPI has three current partners: Tokyo Electron (TEL), a semiconductor equipment manufacturer; Tokyo Ohka Kogyo (TOK), a semiconductor-processing chemical supplier; and LytEn, which uses proprietary unique energy-optimized plasmas at atmospheric pressure to make new nanomaterials at high production volumes. Employees and students from the partner companies work hand-in-hand with university personnel in 3,000+ sq ft. of secure laboratory space on the Research Park adjacent to campus. Website: http://ipi.illinois.edu

The **Laboratory of Computational Plasma Physics (LCPP),** directed by Professor Davide Curreli, develops theoretical and computational models for a variety of Plasma Physics and Plasma Chemistry applications ranging from fusion edge plasmas to industrial plasmas and nuclear forensic, utilizing advanced, predictive simulation capabilities on high- performance computing machines, and multi-physics multi-scale models.
Website: http://curreli.npre.illinois.edu/

The **M**achine Learning and **ARTI**ficial **I**ntelligence for **A**dvancing **N**uclear **S**ystems (**MARTIANS**) **Laboratory,** directed by Assistant Professor Syed Bahauddin Alam, conducts research on Digital Twin for nuclear systems; Real-time and remote monitoring with autonomous operations for advanced reactors; Cybersecurity; Instrumentation and controls for structural health monitoring (SHM) technology, sensor technologies, Explainable AI.

The **Modeling of Nuclear Materials (MNM),** directed by Assistant Professor Jianqi Xi, primarily concentrates on developing integrative strategies to expedite the design of materials for advanced nuclear applications. More specifically, we will integrate multiscale modeling with advanced experimental techniques and state-of-the-art machine-learning algorithms to elucidate the connections between microstructure/microchemistry, corrosion, and radiation responses in nuclear materials. The group aims to furnish essential approaches for steering the development of advanced nuclear materials and predicting materials degradation in nuclear reactors. Research interests include: Multiscale modeling of microstructural evolutions of materials in nuclear applications; Chemical degradation of nuclear materials in corrosive coolant environments (e.g., molten salt and high-temperature water, etc.); Synergistic effects of radiation and corrosion on structural materials; Data driven materials design with desirable radiation/corrosion-resistant properties.
Website: https://publish.illinois.edu/modeling-nuclear-materials/

The **Multiphase Thermo-fluid Dynamics Laboratory,** directed by Associate Professor Caleb Brooks, conducts research focusing on two phase flow and heat transfer. Active research includes: Generating validation data for CFD and system analysis codes; Natural circulation and thermal hydraulic instability; Characterizing wall nucleation parameters in forced convective flows; Critical Heat Flux (CHF) on traditional and engineered surfaces; Two-fluid model with Interfacial Area Transport Equation (IATE); Two-Phase Flow in Molten Salt.
Website: https://mtdl.npre.illinois.edu/

The **Multiphysics and Multiscale (M&Ms) Laboratory,** directed by Assistant Professor April Novak, aims to leverage advanced computational modeling to accelerate nuclear technology development by improving fission and fusion reactor designs through the development and application of accelerated, reliable, and robust numerical analysis techniques. The M&Ms Lab specializes in multiphysics, multiscale algorithms incorporating radiation transport and thermal-fluids.

The **North American Technical Center (NATC) for the Information System on Occupational Exposure (ISOE),** by Adjunct Assistant Professor David Miller, is located at the Department of Nuclear, Plasma, and Radiological Engineering. NATC is one of four technical centers for the Organization for Economic Co-operation and Development (OECD) Nuclear Energy Agency and International Atomic Energy Agency (IAEA) global occupational dose reduction information exchange engineering database. NATC manages the Canadian,

Mexican, and US nuclear power plants data analysis. Website: https://isoe-network.net

The **Nuclear Measurements and Neutron Metrology Laboratory (NML),** directed by Associate Professor Angela Di Fulvio, is a neutron experimental facility for both NPRE students and researchers in NPRE and elsewhere. The lab is equipped with a D-T neutron generator with an emission rate of ~1E8 neutrons/s. The neutron flux density is well-characterized in energy and intensity employing various instruments, including novel multisphere spectrometers, deuterated scintillators, ionization chambers, long counters, calibrated to primary reference standards. Website: https://nmlab.npre.illinois.edu

The **Radiological Imaging Laboratory (RIL),** directed by Professor Ling-Jian Meng, is the home of an extensive collection of instrumental development projects on developing advanced imaging sensors, PET, SPECT, Functional X-ray Imaging, and application-specific image processing techniques. It is also the hub for many ongoing collaborations with premier medical centers around the world to develop large-scale clinical imaging systems for the diagnosis of cancer, cardiovascular diseases, and brain disorders and for guiding the delivery of advanced therapeutics, such as target alpha-therapy (TAT) and stem-cell therapy various types of cancers.

The **Reactor Simulator Laboratory** has a full-scope nuclear reactor simulator. It is used both for educational and research missions. This simulator can model a wide range of operational scenarios---from normal operating conditions to transients and accidents in LWRs. The developer version allows the development of other non-LWR reactor simulators. This versatile and extensible simulator provides students, researchers, and faculty with a realistic, hands-on experience of reactor operations. The simulator is integrated into undergraduate and graduate coursework, allowing students to gain practical experience and a deeper understanding of nuclear engineering principles. Additionally, the simulator serves as a critical tool for research in areas such as hybrid energy systems, digital twins, and probabilistic risk assessment. The simulator's capabilities enable researchers to study remote operations, human factors, and human-machine interfaces in nuclear power plant automation.

The **Socio-Technical Risk Analysis (SoTeRiA) Laboratory,** directed by Associate Professor Zahra Mohaghegh, has a proven track record of advancing Probabilistic Risk Assessment (PRA) for conventional nuclear power plants and advanced reactors. SoTeRiA's key research impacts include (1) minagk scholarly contributions to risk analysis of complex socio-technical systems; (2) bridging scientific research with industry and regulatory challenges; (3) providing strong leadership in risk analysis conferences; (4) advancing risk-informed solutions for new technologies; and (5) promoting international safety and security through risk analysis. SoTeRiA research has received funding from several sponsors, for example, the Nuclear Regulatory Commission (NRC) to advance uncertainty analysis in risk- informed regulation; the National Science Foundation (NSF) to develop a big data-theoretic approach for theorizing and quantifying organizational failure mechanisms in PRA; the Department of Energy (DOE) to advance risk analysis algorithms for the deployment of new technologies; the DOE to develop a systematic enterprise risk management to promote the nuclear fleet sustainability; and the nuclear power industry for fire PRA and for the risk- informed resolution of Generic Safety Issue 191 (GSI-191), a long-standing issue for the NRC and the industry. To promote international safety, the SoTeRiA laboratory has conducted research collaborations with the International Atomic Energy Agency (IAEA) to develop risk methodologies for advanced reactors and the Japan Atomic Energy Agency (JAEA) to advance simulation models for risk-informed emergency preparedness and response. Website: http://soteria.npre.illinois.edu

The **Virtual Education and Research Laboratory (VERL),** directed by Professor Rizwan Uddin, goals are to span research, teaching, service and outreach. Tools used in this lab are innovative and mostly computer based. From fundamental advances in numerical methods; advanced modeling and simulation of different aspects of scientific and engineering problems; to virtual, 3D models for training, education and outreach, this laboratory is focused on development and use of new methods and tools to address fundamental scientific and applied engineering problems. Applications to problems specific to the field of nuclear power include advanced numerical methods development; high performance computing; neutronics, thermal hydraulics and coupled problems; digital I&C and cyber security of NPPs; etc. Website: http://verl.npre.illinois.edu

Other Relevant Research Facilities

The **Beckman Institute for Advanced Science and Technology** at the University of Illinois at Urbana-Champaign is an interdisciplinary research institute devoted to leading-edge research in the physical sciences, computation, engineering, biology, behavior, cognition, and neuroscience. The Institute's primary mission is to foster interdisciplinary work of the highest quality, transcending many of the limitations inherent in traditional university organizations and structures. The Institute was founded on the premise that reducing the barriers between traditional scientific and technological disciplines can yield research advances that more conventional approaches cannot. Website: http://beckman.illinois.edu

The University of Illinois' **Coordinated Science Laboratory** is a premier, multidisciplinary research laboratory that focuses on information technology at the crossroads of computing, control and communications. With a rich history of more than 60 years of innovation, CSL has developed and deployed new technologies that have achieved international scientific recognition and transformed society. Led by a faculty of world-renowned experts and researchers, CSL uses these innovations to explore critical issues in defense, medicine, environmental sciences, robotics, life-enhancement for the disabled and aeronautics. Website: http://csl.illinois.edu

The **Materials Research Laboratory** Central Research Facilities allow for the sharing of expensive and complex cutting-edge research instrumentation while providing for maintenance and continuous development by a dedicated professional staff. The presence of the facilities dramatically enhances intellectual interactions among users. Additionally, having expert scientists to work with users improves efficiency as well as the quality of the scientific results. Website: http://mrl.illinois.edu

The **Micro and Nanotechnology Laboratory** (MNTL) is one of the country's largest and most sophisticated university facilities for conducting photonics, microelectronics, biotechnology, and nanotechnology research. MNTL is the place where campus researchers and visiting scientists come to design, build, and test innovative nanoscale technologies with feature sizes that span the range of atoms to entire systems. Our 16 class 100 and 1000 cleanrooms, 46 general purpose labs, and 2,500 square foot biosafety level-2 bionanotechnology complex contain all the tools researchers need to conduct their work. The building houses faculty and graduate students from the departments of Electrical & Computer Engineering, Bioengineering, Physics, Mechanical Science & Engineering, Material Science & Engineering, Agricultural and Biological Engineering, and Chemical & Biomolecular Engineering. Website: http://mntl.illinois.edu

The **National Center for Supercomputing Applications** (NCSA) is a hub of transdisciplinary research and digital scholarship where University of Illinois faculty, staff, and students, and collaborators from around the globe, unite to address research grand challenges for the benefit of science and society. Current research focus areas are Bioinformatics and Health Sciences**,** Computing and Data Sciences**,** Culture and Society**,** Earth and Environment**,** Materials and Manufacturing**,** and Physics and Astronomy**.** The Center also provides integrated cyberinfrastructure—computing, data, networking, and visualization resources and expertise that are essential to the work of scientists, engineers, and scholars at the University of Illinois at Urbana-Champaign and across the country. NCSA is also an engine of economic impact for the state and the nation, helping companies address computing and data challenges and providing hands-on training for undergraduate and graduate students and post-docs. Website: http://www.ncsa.illinois.edu

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.*	3	4	6
Masters	2	1	2
Ph.D.	2	3	2

* Minor in Nuclear Engineering

Graduate Student Enrollment: 5 Masters/ 12 Ph.D.

Distance Education Program
Offers Nuclear Engineering Courses and Degree Online
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Nuclear Science and Engineering Faculty

Mohamad Al-Sheikhly, Professor (301-405-5214) [mohamad@umd.edu] Ph.D., University of Newcastle Upon Tyne-UK, 1981. 1. Nuclear Reactor Chemistry 2. Extraction of Actinides 3. Radiation Effects on Materials 4. SiC for TRISO Nuclear Fuel. Laboratory for Radiation and Polymer Science

Michelle (Shelby) Bensi, Associate Professor (301-405-4248) [mbensi@umd.edu] Ph.D., University of California, Berkeley, 2010. Probabilistic risk assessment, decision-support, and risk-informed applications for nuclear power; Probabilistic hazard assessment (e.g., seismic, coastal, inland flooding, precipitation, compound); Applications of probability, statistics, and machine learning in engineering; Bayesian networks and other applications of Bayesian methods. Website: riselab.umd.edu

Katrina M. Growth, Associate Professor and Director, Reliability Engineering (301-405-5215)[kgroth@umd.edu] Ph.D., University of Maryland, 2009. Probabilistic risk assessment; system safety; hydrogen; reliability engineering; human reliability analysis. Website: https://crr.umd.edu/ and https://syrra.umd.edu/

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Other Faculty

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Mahmoud Massoud, Lecturer (301-405-2410) [mmassoud@umd.edu] Ph.D., University of Maryland, 1986. Thermal Hydraulic of Nuclear Systems

Nuclear Science and Engineering Research Centers

University of Maryland Radiation Facilities: Research facilities include a 250 kW TRIGA conversion nuclear reactor offering irradiations, neutron activation analysis, neutron radiography and a student reactor operator training program; Panoramic Co-60 Gamma Irradiator providing dose rates in excess of 1 MRad/hr; and 6 MeV Electron Linear Accelerator. Associated dosimetry and radiation metrology equipment are also available. Website: radiation.umd.edu

Maryland University Training Reactor: a dry cell gamma vault irradiator, and a 10 MeV electronlinear accelerator. Website: http://radiation.umd.edu

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	6	9	7
Masters	3	3	2
Ph.D.	2	1	1

Number of Graduates

Graduate Student Enrollment: 47 Masters/8 PhD
ABET Accreditation: Bachelor of Science (BS) Degree in Nuclear Engineering
option in Chemical Engineering

Distance Education Program
Offers Nuclear Engineering Courses Online

Nuclear Science and Engineering Faculty

Sukesh Aghara, Professor and Director, Nuclear Engineering Program (512-293-3388) [Sukesh_Aghara@uml.edu] Ph.D., The University of Texas at Austin, 2001. cyberphysical systems; safeguards; integrated security systems. Website: www.uml.edu/inssl

Partha Chowdhury, Professor (978-934-3730) [Partha_Chowdhury@uml.edu] Ph.D., S.U.N.Y. Stonybrook, 1979. Gamma-ray spectroscopy; nuclear structure.

Stephen T. Lam, Assistant Professor (978-934-3138) [stephen_lam@uml.edu] Ph.D., Massachusetts Institute of Technology, 2020. Computational materials science; artificial intelligence; x-ray absorption spectroscpy; molten salts; nuclear materials; advanced reactors; high-field fusion.
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Justin M. Pounders, Assistant Professor (978-934-5204) [justin_pounders@uml.edu] Ph.D., Georgia Institute of technology, 2010. Reactor physics; radiation transport; multiphysics; nuclear plant simulation.

Erno Sajo, Professor (978-934-3288) [Erno_Sajo@uml.edu] Ph.D., University of Lowell, 1989.Radiation transport; medical physics, aerosol physics; radiation biology.

Subash L. Sharma, Assistant Professor (978-934-5275) [subash_sharma@uml.edu] Ph.D., Purdue University, 2016. Nuclear Reactor Thermal Hydraulics and Safety; Two-Phase flow and Heat Transfer; experiments, modeling and Simulation.
Website: https://www.uml.edu/Engineering/Chemical/faculty/Sharma-Subash.aspx

Mark Tries, Associate Professor (978-934-3353) [Mark_Tries@uml.edu] Ph.D.**,** University of Massachusetts, Lowell, 2000**.** External dosimetry; shielding; radiochemistry.

Anna N. Yaroslavsky, Associate Professor (978-934-3766) [Anna_Yaroslavsky@uml.edu] Ph.D., Saratov State University, Russia. Multimodal image-guided intervention techniques; Biophotonics.

Other Faculty

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Gilbert J. Brown, Emeritus Professor (978-934-3166) [Gilbert_Brown@uml.edu] Ph.D., Massachusetts Institute of Technology, 1974. Nuclear workforce development; public acceptance; material characterization; safety energy economics.

James Egan, Professor Emeritus (978-934- 3774) [James_Egan@uml.edu] Ph.D.**,** University of Kentucky**.** Experimental nuclear physics; neutron physics; spectroscopy; detection.

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Marco Marzo, Associate Director (978-934-5284) [Marco_Marzo@uml.edu] Ph.D., University of Karlsruhe, Germany, 1981. Nuclear non-proliferation, nuclear safeguards and security; nuclear material accountancy; state evaluation approaches.

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Sirikul Sriprisan, Sr., Research Associate (978-934-2519) [Sikikul_Sriprisan@uml.edu] Ph.D., University of Tennessee, 2008. Radiation shielding and protection, mathematical modeling, space radiation transport, neutron and proton beam experiments.

John R. White, Professor Emeritus (978-934-3165) [John_White@uml.edu] Ph.D.**,** University ofTennessee, 1976**.** Research reactor digital control and data acquisition; computational reactor physics; computer methods; reactor modeling.

Nuclear Science and Engineering Research Centers

The **UMass Lowell Radiation Laboratory** houses a 1 megawatt Research Reactor, a multimega curie Cobalt-60 Irradiation Facility, and a 5.5 MeV Van de Graaf particle accelerator. The Radiation Laboratory provides controlled radiation environments and analytical measurement services to government organizations and to industry. The laboratory also provides facilities for proton, neutron and gamma environments and has been used for pure and applied nuclear physics research, for simulating radiation conditions of hostile space environments, for non-destructive testing and analysis, for research and development of radiation resistant electronics and materials, and for research and development of radiation induced modifications to materials.
Website: http://www.uml.edu/centers/RadLab/default.html

Integrated Nuclear Security and Safeguards Laboratory (INSSL) is a multidisciplinary laboratory structured to bring together the expertise in the Nuclear Science and Engineering programs and Center for Terrorism Security Studies to form strategic partnerships in the nuclear security and safeguards area. The INSSL laboratory personnel in partnership with industry and national laboratories work on research projects in radiation detection, material accountancy, and State evaluation processes. INSSL is also engaged in the development of MS and the Graduate Certificate program in Nuclear Security and Safeguards and specialized training programs in this area for working professionals.

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	20	16	15
Masters	19	16	24
PhD	28	22	18

Number of Graduates

Graduate Student Enrollment: 25 Masters/ 106 Ph.D.
ABET Accreditation: B.S.E. (N.E.R.S)

Nuclear Science and Engineering Faculty

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Rebecca K. Lindsey, Assistant Professor (734-763-5142) [rklinds@umich.edu] Ph.D., University of Minnesota, Twin Cities, 2016. Chemistry in inherently multiscaled systems and material evolution under extreme and dynamically changing conditions through advanced simulations and machine learning. Website: https://ners.engin.umich.edu/people/lindsey-rebecca/

Martha Matuszak, NERS Associate Professor, U-M Medical School Professor (734-936-4309) [marthamm@med.umich.edu] Ph.D., University of Michigan, 2007. Treatment planning and optimization for external beam radiotherapy with an emphasis on intensity modulated radiotherapy, volumetric modulated arc therapy, and stereotactic body radiation therapy.
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Ryan D. McBride, Professor (734-763-750) [mcbrider@umich.edu] Ph.D., Cornell University, 2009. Plasma physics; high-energy-density physics; nuclear fusion; radiation generation; pulsed-power technology; plasma diagnostics; magnetically driven, cylindrically imploding systems.
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Sara Pozzi, Professor (734-615-4970) [pozzisa@umich.edu] Ph.D., Polytechnic of Milan, Italy, 2001. Radiation detection; nuclear nonproliferation; nuclear safeguards; homeland security; treaty verification; physics of fission. Website: https://ners.engin.umich.edu/people/pozzi-sara/

Majdi Radaideh, Assistant Professor (734-764-7679) [radaideh@umich.edu] Ph.D., University of Illinois, 2021. Multiphysics reactor design; advanced computing; autonomous control.
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Stephen Raiman, Assistant Professor [sraiman@umich.edu] Ph.D., University of Michigan, 2016. Materials in extreme environments; High-temperature corrosion; Radiation effects in materials; Environmentally assisted cracking; Materials compatibility with molten salts; Mechanical behavior of materials.
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Website: https://ners.engin.umich.edu/people/sun-xiaodong/

Alexander G.R. Thomas, Professor (734-763-6008) [agrt@umich.edu] Ph.D., Imperial College, London, UK, 2007. High-power laser-plasma interactions, particle accelerators, radiation sources, kinetic plasma computation. Website: https://ners.engin.umich.edu/people/thomas-alec/

Katsuyo Thornton, Professor (734-615-1498) [kthorn@umich.edu] Ph.D., University of Chicago, 1997. Computational and theoretical investigations of the evolution of microstructures and nanostructures during processing and operation. Website: https://ners.engin.umich.edu/people/katsuyo-thornton/

Aditi Verma, Assistant Professor [aditive@umich.edu] Ph.D., Massachusetts Institute of Technology, 2019. Design of nuclear and complex technologies; Institutional infrastructures of technologies; Just and equitable technology design; Creative and participatory design processes; Epistemic inclusivity in technology design; Fundamental understanding of the early stages of the design process; Improvement of design practice and pedagogy; Development of tools for designers of complex systems.
Website: https://ners.engin.umich.edu/people/verma-aditi/

Lumin Wang, Professor (734-647-8530) [lmwang@umich.edu] Ph.D., University of Wisconsin-Madison, 1988. Radiation effects, ion beam modification of materials; transmission electron microscopy; nanostructured materials, and nuclear engineering materials.
Website: https://ners.engin.umich.edu/people/wang-lu-min/

David K. Wehe, Professor (734-763-1151) [dkw@umich.edu] Ph.D., University of Michigan, 1984. Radiation measurements and applications. Website: https://ners.engin.umich.edu/people/wehe-david/

Louise Willingale, Associate Professor (734-647-9543) [wlouise@umich.edu] Ph.D., Imperial College, London, 2007. Intense laser-plasma interactions; laser-driven ion acceleration; relativistic laser propagation through underdense and near-critical density plasmas; and proton deflectometry; electric and magnetic fields generated during laser-plasma interactions.
Website: https://ners.engin.umich.edu/people/louise-willingale/

Won Sik Yang, Professor (734-647-8117) [wonyang@umich.edu] Ph.D., Purdue University, 1989. Nuclear Engineering; Nuclear reactor physics; computational methods for reactor analysis; reactor core design; fuel cycle analysis; fast reactors; accelerator driven systems; sensitivity/uncertainty analysis; cross section processing; stability analysis; and reliability analysis.
Website: https://ners.engin.umich.edu/people/yang-won-sik/

Y Z, Professor (734-647-4338) [yzyz@umich.edu] Ph.D., Massachusetts Institute of Technology, 2010. Matter—Rare events and long timescale phenomena in complex material systems; Physics and chemistry of liquids, glasses, and complex fluids, especially under interfacial/extreme/non-equilibrium conditions (water, metallic liquids, molten salts, ionic liquids, electrolyte solutions); Statistical mechanics and molecular fluid mechanics theories, accelerated molecular simulations, understandable AI methods; Neutron scattering, sources, and instrumentation. Machine—Soft robots and human-compatible machines; Swarm robots and collective intelligence; Robots in extreme environments.
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Peng Zhang, Associate Professor [umpeng@umich.edu] Ph.D., University of Michigan, 2012. Theory and modeling of nanoelectronics, electromagnetic fields and waves, plasmas, and accelerator technology. He has worked on electrical contacts, thin films, classical, ballistic, and quantum diodes, space-charge-limited current flows, beam-circuit interaction, microwave absorption on rough surfaces, multipactor and breakdown, slow wave structures, z-pinches, laser-plasma interaction, and more recently on vacuum nano devices, quantum tunneling plasmonic junctions, ultrafast photoemission, and novel miniaturized light sources.

Other Faculty

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Alex F. Bielajew, Professor Emeritus (734-764-6364) [bielajew@umich.edu] Ph.D., Stanford University, 1982. Theory of electron and photon transport; Monte Carlo theory and development; radiation dosimetry theory; radiotherapy treatment planning algorithms.
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Adam Burak, Assistant Research Scientist (734-764-42600 [ajburak@umich.edu] Ph.D., University of Utah, 2019. Molten salt chemistry, electrochemistry, high temperature spent nuclear fuel reprocessing, severe environment materials, molten salt corrosion, experimental design, and prototype design.
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Jonathan Cirtain, Adjunct Professor [jwcirtain@bwxt.com] Ph.D., Montana State University, 2005. GIS Data Science; Space physics; Spacecraft systems design; Remote sensing data analysis and analytics; Nuclear rocket systems; Nuclear Medicine and Human Radiation Effects.
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Shaun D. Clarke, Associate Research Scientist (734-615-7830) [clarkesd@umich.edu] Ph.D., Purdue University, 2007. Simulation techniques for active interrogation systems using high-energy photons - methods under investigation include photoneutron energy spectra and multiplicity analysis.
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Terry Kammash, Professor Emeritus (734-764-0205) [tkammash@umich.edu] Ph.D., University of Michigan, 1958. Theoretical and computational investigations of high temperature plasma confinement in magnetic fusion devices, including the study of equilibrium, transport, and stability of plasma in toroidal and open-ended devices; inertial confinement fusion; plasma engineering; power producing fusion reactors; space applications of nuclear energy.
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Imre Pázsit, Adjunct Professor (46-31-772-3081) [imre@nephy.chalmers.se] Ph.D., Roland Eotvos University, Budapest, 1975. Theory of neutron fluctuations in multiplying materials with application to nuclear material detection and identification; stochastic theory of neutron slowing down, energy deposition and light generation in detectors; solving inverse problems in material identification; deterministic and stochastic transport of neutrons and charged particles; dynamics and diagnostics of current and future reactor systems. Website: https://ners.engin.umich.edu/people/pazsit-imre/

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W. Geoffrey West, Adjunct Professor [pilatus@umich.edu] Ph.D., University of Michigan, 2011. Diagnostic medical and health physics consulting; Diagnostic imaging quality assurance; Radiation dose reduction; MRI operations; Technical and regulatory roles in nuclear technology; Image quality and radiation safety issues; Standards for imaging accreditation. Website: https://ners.engin.umich.edu/people/west-geoff/

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Nuclear Science and Engineering Research Centers

The Applied Nuclear Science Instrumentation Laboratory features approximately 1000 sqft of quality space and supports the development of advanced instrumentation for a wide range of projects. Some examples of current research include the development of novel neutron and antineutrino detectors and detection methodologies for applications in nuclear security, nonproliferation, nuclear power, and fundamental scientific research. Website: https://ansg.engin.umich.edu/applied-nuclear-science-instrumentation-laboratory/

Artificial Intelligence and Multiphysics Simulations (AIMS) Laboratory focuses on the intersection between nuclear reactor design, Multiphysics modeling and simulation, advanced computational methods, and machine learning algorithms to drive advanced reactor research and improve the sustainability of the current reactor fleet. The lab develops software capabilities that can be deployed on experimental systems. Their current project involves advanced reactor optimization, autonomous control for microreactors, digital twin development for reactor systems, explainable machine learning framework for licensable AI technologies, robotics and drone-based autonomous inspection, and the use of large language models for sentiment analysis of nuclear power around the United States.

Center for High Energy Density Laboratory Astrophysics Research (CHEDAR) study fundamental high-energy-density plasmas relevant to astrophysical systems, the National Nuclear Security Administration mission of science-based stockpile stewardship, and inertial confinement fusion concepts. They create these systems using high-energy laser and pulsed-power facilities and simulate them using the radiation hydrodynamics code CRASH. The research focus is hydrodynamic instabilities, radiation hydrodynamics, and magnetized flows. Researchers also fabricate and characterize experimental targets and research novel diagnostic techniques. This is a National Nuclear Security Administration Stewardship Science Academic Alliances (SSAA) Center of Excellence.

Center for Magnetic Acceleration, Compression, and Heating (MACH) explore hot, dense plasmas using powerful magnetic pulses, most commonly using z-pinch implosions that rely on magnetic fields to crush plasmas in cylindrical form toward the central “z” axis. The MACH team focuses on achieving symmetric compression, preparing to build more powerful fusion machines, and exploring fundamental physics. The center is an extremely flexible space that encourages student creativity to support research at national labs. Partner institutions include Cornell University, Imperial College London, Weizmann Institute of Science, Princeton University, UC San Diego, Massachusetts Institute of Technology, University of New Mexico, University of Rochester, University of Washington, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratories. This is a National Nuclear Security Administration Stewardship Science Academic Alliances (SSAA) Center of Excellence.

Detection for Nuclear Nonproliferation Group Laboratory is focused on the development of new tools and techniques for the detection and characterization of special nuclear materials, such as uranium and plutonium, and narcotics. Our research has applications in the areas of nuclear safeguards, nuclear nonproliferation, and homeland security. We develop new measurement systems based on scintillation detectors for the detection of neutron and gamma-ray sources. DNNG research also focuses on characterizing the properties of new scintillation materials (e.g., efficiency, light output, anisotropic response, etc.), including readout systems to improve pulse-shape discrimination performance. This laboratory is used in the senior-graduate laboratory course in detection for nuclear non-proliferation, NERS 535. Website: dnng.engin.umich.edu/

Experimental and Computational Multiphase Flow (ECMF) Laboratory was established in 2013 with the purpose of advancing and understanding thermal-hydraulics and fluid-dynamics phenomena of relevance for nuclear applications. In the ECMF lab, we perform fluid dynamic experiments using in-house advanced state-of-the-art high-resolution experimental techniques such as wire-mesh sensors and Particle Image Velocimetry (PIV) combined with novel refractive-index matching techniques. Experimental facilities in the lab are used to investigate the propagation of stratified fronts, mixing in plena, and turbulence-induced thermal fatigue in isolated branch lines. The highly resolved (in time and space) experimental data are used to establish a database for the validation and further development of Computational Fluid Dynamics models.

Fastest Path to Zero Initiative is dedicated to addressing challenging questions about how policymakers, researchers, and communities can collaborate to achieve ambitious climate goals in Michigan and nationwide. The initiative focuses on building and maintaining external and cross-campus collaborations to optimize the use of nuclear energy in the 21st century. It emphasizes participatory research by developing inclusive approaches to the design and deployment of nuclear energy infrastructure. The team also creates user-friendly decision-support tools to assist advanced nuclear companies in locating potential host communities. A significant aspect of Fastest Path's work involves researching historical and current nuclear equity and justice issues, as well as understanding community needs and societal preferences. Website: https://fastestpathtozero.umich.edu/

Gérard Mourou Center for Ultrafast Optical Science (CUOS) researchers develop optical instrumentation and techniques to generate, manipulate, and detect ultrashort and ultrahigh-peak-power light pulses. They use these ultrashort pulses to study ultrafast physical phenomena in atomic, nuclear, plasma, and materials physics, solid-state electronics, high-energy-density physics, and biomedicine. The center houses ZEUS, the NSF-supported, highest-power laser system in the U.S., which facilitates exploration of fundamental yet unresolved questions in non-linear quantum electrodynamics within relativistic plasmas, such as quantum radiation reaction and electron-positron pair production mechanisms. Website: cuos.engin.umich.edu

High-Resolution TH Imaging Laboratory, we develop and apply measurement techniques for quantitative imaging of single-phase and multiphase flows in complex geometries and high-pressure systems. The latest developments include an in-house, high-resolution gamma tomography system, and a high-speed X-ray radiography system. Additional high-resolution instrumentation employed in the lab includes wire-mesh sensors and fiber optic probes. The high-resolution experiments are being performed to investigate two-phase flows in fuel bundles, helical coils, and post-CHF two-phase flow regimes at high pressure/temperature. Additional experiments include setups to investigate the behavior of heat pipes for micro-reactor applications and hydrogen migration in nuclear fuel cladding materials.

High-Temperature Corrosion Laboratory (HTCL) provides the capability to conduct corrosion, stress corrosion cracking, and hydrogen embrittlement tests in high-temperature aqueous environments and, in particular, simulated light-water reactor environments. The corrosion laboratory has unique facilities for conducting both high and low-temperature corrosion, stress corrosion cracking (SCC), electrochemical testing, and mechanical testing. Website: https://htcl.engin.umich.edu

Irradiated Materials Testing Complex (IMTC) provides the capability to conduct high-temperature corrosion and stress corrosion cracking of neutron-irradiated materials and to characterize the fracture surfaces after failure. The laboratory consists of a high-temperature autoclave, circulating water loop, load frame, and servo motor for conducting constant extension rate tensile (CERT) and crack growth rate (CRG) tests in subcritical or supercritical water up to 600°C. Website: https://imtl.engin.umich.edu/

Materials in High Temperatures and Extreme Environments (MiHTEE) Laboratory supports innovative nuclear technologies by recreating extreme environments and developing new materials that can withstand those extremes. The laboratory includes facilities for multiple molten salt or liquid metal loops, glove boxes for handling air-sensitive materials, including uranium and beryllium-containing materials, high-temperature furnaces, a hot isostatic press for fabricating materials, and analytical equipment for working with molten salts and other materials. Website: https://sites.lsa.umich.edu/mihtee/

Michigan Augmented Reality (AR) Laboratory technologies using head-mounted devices allow the display of complex data to a user directly as holographic impressions. We are interested in visualizing radiation fields and radioactive sources both for education and real-world source search scenarios. In the AR creator's space, we provide the testing grounds for such technologies, bringing together computer scientists and nuclear engineers to develop a new way of perceiving radiation.

Michigan Center for Materials Characterization ((MC)2) houses state-of-the-art equipment, including aberration-corrected transmission electron microscopes, dual-beam focused ion beam/scanning electron microscopes, an x-ray photoelectron spectrometer, a tribo-indenter, an atomic force microscope, and an atom probe tomography instrument. A few of the instruments contained at the laboratory include Tescan MIRA3 FEG SEM, Tescan RISE SEM, FEI Quanta 3D e-SEM/FIB, FEI Nova 200 Nanolab SEM/FIB, and more. Website: https://mc2.engin.umich.edu/

Michigan Ion Beam Laboratory (MIBL) was established for the purpose of advancing our understanding of ion-solid interactions by providing up-to-date equipment with unique and extensive facilities to support research at the cutting edge of science. The lab houses a 3 MV pelletron accelerator, a 1.7 MV tandem accelerator, and a 400 kV ion implanter. This laboratory is used in the senior laboratory course NERS 425, Applications of Radiation. Website: mibl.engin.umich.edu

Michigan LINAC Laboratory This approximately 2,000 ft2 laboratory houses a Varian M9 electron LINAC and associated detection systems. The Varian M9 is a commercially available LINAC that accelerates electrons up to 9 MeV onto a high-Z converter material to produce X-rays with a Bremsstrahlung spectrum up to 9 MeV. The accelerator is contained in a room in the corner of the lab whose walls act as additional collimation for the X-ray beam. After the collimator, the approximately 15 m long beamline is used for active interrogation experiments. Additionally, the beamline is used to perform time-of-flight characterization of the photonuclear reaction products. This facility enables active interrogation experiments using a variety of targets available on campus, including depleted uranium, lead, and tungsten.

Michigan Scintillator Laboratory we melt-cast new scintillators, such as new plastic and organic glass scintillators. The laboratory is equipped with fume hoods, scientific ovens, and other relevant equipment. We also develop multi-detector arrays to characterize the emissions from nuclear fission. Specifically, we have recently designed and developed a spherical array of 40 organic stilbene detectors and a custom fission chamber in collaboration with Argonne National Laboratory.

Neutron Science Laboratory is dedicated to advancing the fundamental understanding and applications of neutron science, particularly the development of radiation detection materials, devices, and systems. The lab space is equipped with DD and DT neutron generators, radioisotope neutron sources, and a variety of standard and advanced radiation detectors and nuclear electronics. Website: https://ansg.engin.umich.edu/facilities/neutron-science-laboratory/

Nuclear Measurements Teaching Laboratory introduces students to the devices and techniques most common in nuclear measurements. Experiments include the operation of gas-filled, solid-state, and scintillation detectors for charged particles, gamma rays, and neutrons. The laboratory has four stations, each with an oscilloscope, a suite of nuclear electronics, a high-purity germanium detector, and a PC equipped with a multichannel analyzer.

Nuclear Plant Simulation Laboratory (NPSL) was established in 2019 with the installation of the Generic Pressurized Water Reactor Simulator. This simulator represents the entire instrumentation and control (I&C) system of a three-loop Westinghouse PWR plant with all its gauges, knobs, recorders and control systems. The Simulator satisfies the U.S. Nuclear Regulatory Commission requirements for licensed reactor operator training and is being modified to represent the I&C system of the six-unit NuScale SMR plant under development. With an investment of $105,000 made for the Simulator, it is currently used for a cyber-security NEUP project and for various nuclear reactor analysis and design classes. With the development of efficient and secure digital I&C systems looming as a new frontier for nuclear engineers, we plan to use the Simulator as an integral part of advanced nuclear plant development projects going forward. The NPSL also includes an interactive Virtual Reality (VR) model of Michigan's Ford Nuclear Reactor. This environment is used for teaching and conducting experiments that were previously a part of the NERS curriculum when the FNR was still operational. This platform which was developed with support from Michigan's Center for Academic Innovation also provides a unique digital infrastructure for research into developing digital twin and VR technology for nuclear engineering applications.

Nuclear Reactor Analysis and Methods (NURAM) Center provides technical expertise in reactor analysis, including design and safety analysis, and methods development. NURAM includes faculty, research scientists, postdoctoral fellows, and PhD students. NURAM faculty, staff, and students, are involved in the development of advanced computational methods for analysis of coupled nuclear reactor phenomena including neutron transport, thermal/hydraulics, materials performance, and validation of these methods against experimental data. Specifically, NURAM develops and maintains the U.S. Nuclear Regulatory Commission's core simulator PARCS, and the next-generation high-fidelity neutronics code MPACT that is a part of VERA. The group also develops and maintains the AGREE code for the US NRC, as well as derivatives for industry partners. In addition to developing codes, the personnel of NURAM also maintain expertise in many other computational tools used for reactor analysis. These tools come from U.S. National Labs, many from the NEAMS program, including VERA, Griffin, BISON, RAVEN, SAM, MC2, SHIFT, SCALE, MCNP, and DIF3D. NURAM also maintains academic licenses to many industry products such as Westinghouse's APA package, CASMO-4/SIMULATE, HELIOS, STAR-CCM+, ANSYS, and more. Website: https://nuram.engin.umich.edu

Nuclear Reactor Design and Simulation Laboratory (NRDSL) aims to develop advanced nuclear reactors and associated fuel cycle concepts and core design and fuel cycle analysis methods by integrating advances in reactor physics, thermal-hydraulics, materials, and computing technologies.

Plasma, Pulsed Power, and Microwave Laboratory (PPML) uses powerful electromagnetic pulses to generate plasmas and charged particle beams. The lab features three premier pulsed power facilities: MELBA, MAIZE, and BLUE. These machines produce momentary bursts of electrical power (hundreds of billions of watts) to study high-power electromagnetic phenomena. Areas of interest include nuclear fusion, extreme material states, and extreme radiation generation (x-rays, neutrons, and high-power microwaves). Lab research efforts include experiment, theory, and computation. Website: plasmabay.engin.umich.edu

Plasma Science and Technology Laboratory focus is on understanding and applying plasma science to real-world problems. The lab has four major thrust areas: plasma/nuclear-derived space propulsion, environmental hazard mitigation (water treatment, surface sterilization, sanitation and plasma-based plastics waste treatment-both depolymerization and decomposition), and basic plasma science such as self-organization and the mysteries of the plasma liquid interface. Particular attention is paid to those applications that protect the environment and those that improve the quality of life in underdeveloped countries. Here, research focuses on using plasmas to achieve sustainability and reuse of resources here on Earth—the resulting technologies have applications in space exploration as well, supporting in situ resource utilization. The laboratory houses a number of vacuum tanks and associated power systems such as DC, rf, and microwave power sources for plasma production. Advanced laser diagnostics are also used to probe fields and particles in the plasmas under test. Website: pstlab.engin.umich.edu

Position-Sensing Semiconductor Radiation Detector Laboratory is dedicated to the development of room-temperature semiconductor radiation detectors. These instruments are being developed for applications in nuclear nonproliferation, homeland security, astrophysics, planetary sciences, medical imaging, and high-energy physics experiments. This lab is home to the Orion Radiation Measurement Group.
Website: cztlab.engin.umich.edu

Radiological Health Engineering (RHE) Laboratory is a Radiation Detection and Protection MakerSpace, and, as such includes equipment, radioactive sources, and space for the development and testing of new instruments and systems for application to specific radiological health problems. Work is concentrated on practical systems and radiation measurement methods deployable within the immediate future. Equipment includes temporal radon measurement instruments, a variety of payload-capable drones, thermoluminescent and optically luminescent dosimetry systems, a high volume extremely sensitive gamma-ray spectroscopic system for environmental samples, and several augmented and virtual reality headsets. Much research in this laboratory is conducted by undergraduate teams, who have developed a radiation detection game, a build-your-own Geiger counter, and a radiation weather station suitable for STEM outreach. Website: rhelab.engin.umich.edu

Thermal Hydraulics Laboratory (THL) carries out separate-effect and integral-effects tests in reactor thermal hydraulics to support the safe and economical operation of light water reactors (LWRs) and development of advanced non-LWR reactors, including molten salt reactors and high-temperature gas-cooled reactors. It has established a number of high-temperature test facilities, including molten salt and helium test facilities, to understand key physical phenomena and develop experimental data for validation of safety analysis and computational fluid dynamics models.

Z Lab research can be summarized into two words: Matter and Machine. In the realm of Matter, they synergistically integrate statistical mechanics and molecular fluid mechanics theories, accelerated molecular simulations, understandable AI methods, and neutron scattering experiments to extend our understanding of rare events and long timescale phenomena in complex material systems. Particular emphasis is placed on the physics and chemistry of liquids and complex fluids, especially at interfaces, under extreme conditions, or when driven away from equilibrium. Concurrently, on the Machine front, leveraging their expertise in materials and modeling, they advance the development of soft robots and human-compatible machines, swarm robots and collective intelligence, and robots in extreme environments. These two research areas, spanning from fundamental to applied, serve as integral pillars in our overarching mission to foster a sustainable, resilient, and secure energy infrastructure.

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	7/21 - 6/22	7/22 - 6/23	7/23 - 6/24
Masters	3	0	2
PhD	2	0	2

Number of Graduates

Graduate Student Enrollment: 1 4 Masters/ 1 0 Ph.D.
Graduate Certificates in Nuclear Criticality Safety & Nuclear Safeguards and Security.

Nuclear Science and Engineering Faculty

Alexander Barzilov, Professor (702-895-4325) [alexander.barzilov@unlv.edu] Ph.D., Institute for Physics and Power Engineering, 1997. Radiation detection; gamma spectroscopy; remote sensing of radiation using aerial and ground robotic platforms; active and passive assay of radiological materials; reactor physics. Website: http://www.unlv.edu/people/alexander-barzilov

Yitung Chen, Professor (702-895-1202) [yitung.chen@unlv.edu] Ph.D., University of Utah, 1991. Thermal-hydraulic with neutronics on MSR and PWR; nuclear thermal propulsion reactors

William G. Culbreth, Associate Professor (702-895-3426) [William.Culbreth@unlv.edu] Ph.D., University of California, Santa Barbara, 1981. Molten Salt Technology for Energy Storage; Spent Nuclear Fuel Storage, Pulsed Reactor Design. Website: https://www.unlv.edu/me

Thomas Hartmann, Instructor (702-895-1934) [thomas.hartmann@unlv.edu] Ph.D., University Heidelberg / Karlsruhe Institute of Technology (Germany). Nuclear waste forms; advanced nuclear fuels; x-ray crystallography; solid phase analysis. Website: https://www.unlv.edu/me

Charlotta E. Sanders, Associate Research Professor (702-984-33190) [charlotta.sanders@unlv.edu] Sc.D., KTH Royal Institute of Technology, 1999. Nuclear Criticality Safety; Radiation Protection; Nuclear Waste Management; Nuclear Fuel Cycle. Website: https://www.unlv.edu/people/charlotta-sanders

UNIVERSITY OF NEW BRUNSWICK

Chemical Engineering
P.O. Box 4400
Fredericton, NB E3B 5A3
506-453-4520
Administrative Contact: William Cook
506-452-6318
wcook@unb.ca
Website: http://www.unb.ca/fredericton/engineering/depts/chemical/

Graduate Student Enrollment: 12 Masters/6 Ph.D.
CEAB Accreditation BScE

Nuclear Science and Engineering Faculty

William G. Cook, Professor and Department Chair (506-452-6318) [wcook@unb.ca] Ph.D., University of New Brunswick, 2005. Reactor chemistry & corrosion, small modular reactors

Olga Y. Palazhchenko, Associate Professor (506-453-4540) [olga.palazhchenko@unb.ca] Ph.D., University of New Brunswick, 2017. Simulation & modelling; reactor chemistry & corrosion; ion-exchange processes.

Nuclear Science and Engineering Research Centers

Center for Nuclear Energy Research (CNER): University Research Institute specializing in test systems that simulate reactor coolant systems for chemistry and corrosion studies and experiments.
Website: www.unb.ca/research/cner

UNIVERSITY OF NEW MEXICO

Department of Nuclear Engineering
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Albuquerque, NM 87131-0001
505-277-5431
FAX: 505-277-5433
Administrative Contact: Yvoné Nelson
505-277-2692
nelsony@unm.edu
Website: ne.unm.edu

	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	16	9	19
Masters	14	9	13
Ph.D.	1	5	3

Number of Graduates

Graduate Student Enrollment:14 Masters/ 33 Ph.D.
ABET Accreditation: Bachelor of Science (BS) Degree in Chemistry and Nuclear Engineering

Distance Education Program
Offers Nuclear Engineering Courses Online ne.unm.edu

Nuclear Science and Engineering Faculty

Osman Anderoglu, Associate Professor (505-277-0667) [oanderoglu@unm.edu] Ph.D., Texas A&M University, 2010. Development and testing of advanced alloys for advanced reactors; heavy liquid metal coolant-structural materials compatibility; advanced manufacturing for nuclear applications; mechanical testing of radioactive materials.

Minghui Chen, Assistant Professor (505-277-1941) [mnu@unm.edu] Ph.D., University of Michigan, 2018. Nuclear reactor thermal hydraulics and safety; High-temperature thermal-fluid systems (molten salt, sCO2, liquid metal, helium); Innovative heat exchanger design, optimization, modeling, and testing; Advanced thermal power cycles and thermal energy storage; and Molten Salt Reactors, Sodium-cooled Fast Reactors, High-Temperature Gas-cooled Reactors, Concentrated Solar Power, and Micro-Reactors.
Website: https://www.thermalhydraulic.com/

Mohamed S. El-Genk, Distinguished and Regents' Professor (505-277-5442) [mgenk@unm.edu] Ph.D., The University of New Mexico, 1981. Space nuclear power systems and Nuclear Thermal Propulsion; Small and micro reactors' design and analyses; Nuclear reactors' thermal hydraulics; CFD analyses and applications to gas, liquid metals and water-cooled reactors and complex energy systems; radiation shielding of ionized space energetic particles; high and low temperature heat pipes and applications to nuclear reactor, energy systems and waste heat rejection for space nuclear reactor power systems; nuclear fuel and high temperature materials; static and dynamic energy conversion and applications; nuclear reactor plants' cybersecurity; boiling heat transfer and two-phase flow; nuclear reactors' kinetics and control. Website: https://isnps.unm.edu/

Cassiano R. Endres de Oliveira, Professor (505-277-5661) [cassiano@unm.edu] Ph.D., University of London, 1986. Computational Radiation Transport.
Website: https://ne.unm.edu/faculty-staff/faculty-profiles/cassiano-oliveira.html

Adam A. Hecht, Professor (505-277-1654) [hecht@unm.edu] Ph.D.**,** Yale University**,** 2004**.** Radiation Detection; Detector Development; Nuclear Data; Data Mining. Website: www.unm.edu/~hecht

Eric Lang, Assistant Professor (505-277-0772) [ejlang2@unm.edu] Ph.D., University of Illinois - Urbana Champaign, 2020. Nuclear materials; irradiation damage; fusion materials; materials characterization. Website: https://www.unm-charisma-lab.com/

Hyoung K Lee, Professor (505-277-0686) [leehk@unm.edu] Ph.D., University of California at Berkeley, 1995. Radiation detection; nuclear imaging; nuclear nonproliferation.

Christopher Perfetti, Associate Professor (505-277-1945) [cperfetti@unm.edu] Ph.D., University of Michigan, 2012. Nuclear reactor physics; radiation transport; nuclear criticality safety; Monte Carlo methods; sensitivity and uncertainty analysis.
Website: https://ne.unm.edu/faculty-staff/faculty-profiles/christopher-perfetti.html

Other Faculty

Robert D Busch, Principal Lecturer Emeritus (505-277-8027) [busch@unm.edu] Ph.D.**,** University of New Mexico**,** 1976**.** Nuclear criticality safety; reactor physics measurements; laboratory educational techniques**.** Professional Engineer.

Gary W. Cooper, Research and Associate Professor Emeritus (505-277-2557) [garywc@unm.edu] Ph.D., University of Illinois, 1976. Neutron diagnostics of fusion plasmas.

Anil K. Prinja, Distinguished Professor Emeritus (505-277-5431) [prinja@umn.edu] Ph.D., Queen Mary College, University of London, U.K., 1980. Stochastic Particle Population Modeling; Radiation Transport in Stochastic Media; Charged Particle Transport.

Nuclear Science and Engineering Research Centers

AGN Reactor, Small sample reactivity measurements and rossi-alphameasurements.

Center for Nuclear Nonproliferation Science and Technology: Interdisciplinary center promoting class and lab coursework and laboratory research.

Nuclear nonproliferation research laboratory: For work on radiation detection materials and techniques, with capabilities in multichannel digital data acquisition, high vacuum and controlled gas environments.

UNIVERSITY OF PITTSBURGH

Nuclear Engineering Program
Department of Mechanical Engineering and Materials Science
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tvc9@pitt.edu
Website: http://www.engineering.pitt.edu/MEMS/

	7/21-6/22	7/22-6/23	7/23-6/24
Masters	9	5	6

Graduate Student Enrollment: 5 Masters
ABET Accreditation: Mechanical Engineering, Materials Science and Engineering

Distance Education Program
Offers Nuclear Engineering Courses and Degrees Online
http://www.engineering.pitt.edu/nuclear/

Nuclear Science and Engineering Faculty

Heng Ban, R.K. Mellon Professor in Energy and Director of Nuclear Engineering (412-624-0325) [heng.ban@pitt.edu] Ph.D., University of Kentucky, 1994. Thermal properties and measurement techniques for nuclear materials, transient fuel performance, sensor development for in-pile applications. Professional Engineer.

Daniel Cole, Associate Professor (412-624-3069) [dgcole@pitt.edu] Ph.D., Virginia Polytechnic Institute and State University, 1998. Dynamic systems; measurement and control. Professional Engineer

Minking Chyu, Leighton Orr Chair Professor and Associate Dean for International Initiatives (412-624-9783) [mkchyu@pitt.edu] Ph.D., University of Minnesota, 1986. Heat and mass transfer; turbomachinery.

Thomas Congedo, Professor and Associate Director of Nuclear Engineering (412-624-9799) [tvc9@pitt.edu] Ph.D. Nuclear Physics. Nuclear Core Engineering, Criticality Safety, and nuclear technology applications in substance detection and materials modification.

Jung-Kun Lee, Assistant Professor (412-648-3395) [jul37@pitt.edu] Ph.D.**,** Seoul National University**,** 2000**.** Nanotechnology; radiation effects on Material Properties; Ion-beam Synthesis of functional materials. Website: http://www.engr.pitt.edu/mems/people/facstaff/lee_jungkun.html

Jorg Wiezorek, Professor (412-624-5430) [wiezorek@pitt.edu] Ph.D., University of Cambridge, Cambridge, UK**,** 1994**.** Materials Science & Engineering; Physical Metallurgy & Metal Physics; Phase Transformations; Micro-Characterization & Analysis by Diffraction and Spectroscopy; Transmission Electron Microscopy; Scanning Electron Microscopy; Mechanical Behavior; Microstructure Engineering.

Tatsuya Sakurahara, Assistant Professor (412-648-4247) [tsakurahara@pitt.edu] Ph.D., University of Illinois at Urbana-Champaign, 2018. Probabilistic risk assessment (PRA), reliability and maintainability analysis, probabilistic physics-of-failure simulation, human reliability analysis, uncertainty quantification, and risk-informed decision-making.

Other Faculty

David Aumiller, Adjunct Associate Professor (724-516-9437) [dla12@pitt.edu] Ph.D., Pennsylvania State University, 1996. Two-phase flow and heat transfer; best-estimate plus uncertainty methods development; reactor safety code development.

Ken Balkey, Adjunct Lecturer (412-374-4633) [balkeykr@westinghouse.com] M.S.**,** University of Pittsburgh**,** 1980**.** Nuclear codes and standards; risk assessment; mechanical component integrity; nuclear reactor pressure vessel integrity; piping design-by-analysis.

John Bartocci, Adjunct Lecturer (412-624-5430) [jtb51@pitt.edu] B.S.**,** Massachusetts Institute of Technology**.** SRO Certified Instructor.

Bruce Berquist, Adjunct Associate Professor (412-476-6053) [berqb@comcast.net] Ph.D., University of Pittsburgh**,** 1979**.** Nuclear materials development.

Heather Detar, Faculty Lecturer (412-716-1445) [detarhl@westinghouse.com] B.S., The Pennsylvania State University, 2005. PRA Research.

Gary Elder, Faculty Lecturer (412-856-5967) [eldergg@westinghouse.com] Ph.D., University of Pittsburgh**,** 1982**.** Operating nuclear plants.

Daniel Gill, Adjunct Lecturer (412-476-7714) [dfg3@pitt.edu] Ph.D., The Pennsylvania State University**,** 2009. **N**umerical particle transport theory; computational physics; numerical analysis.

David Griesheimer, Adjunct Assistant Professor (412-624-5430) [dpg20@pitt.edu] Ph.D., University of Michigan, 2004. Computational methods of radiation transport; Monte Carlo methods; Multiphysics methods for reactor analysis; high performance and parallel computing.

Jason Gruber, Adjunct Assistant Professor (412-624-5430) [jas182@pitt.edu] Ph.D., Carnegie Mellon University, 2007. Computational materials science, multiscale materials modeling, microstructural science, texture and anisotropy, numerical methods and global optimization.

David Haser, Faculty Lecturer (412-367-9177) [haserd@firstenergy.com] MBA**,** Youngstown State University**,** 2005**.** SRO License; Safety Culture; Plant Operation Improvements; Nuclear Plant Operations and Safety. Professional Engineer.

Sola Talabi, Adjunct Professor and Associate Director of Nuclear Engineering (412-448-6823) PhD, Carnegie Mellon University, 2013. Advanced reactors, risk and safety management.

UNIVERSITY OF SOUTH CAROLINA

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Website: https://cec.sc.edu/nuclear

	7/21-6/22	7/22-6/23	7/23-6/24
Masters	5	1	4
PhD	1	2	2

Number of Graduates

Graduate Student Enrollment: 14 Masters/ 8 Ph.D.

Distance Education Program
Offers Nuclear Engineering Courses and Degrees Online
https://cec.sc.edu/nuclear

Nuclear Science and Engineering Faculty

Travis W. Knight, Professor and Chair (803-777-1465) [twknight@sc.edu]
Ph.D., University of Florida, 2000. Advanced nuclear fuels and materials; nuclear safeguards; nuclear fuel cycle analysis; alternative uses of nuclear power; risk and safety analysis; space nuclear power and propulsion. Website: https://cec.sc.edu/knight

Sourav Banerjee, Professor (803-777-4596) [banerje@cec.sc.edu] Ph.D., University of Arizona, 2005. Engineering Mechanics; Ultrasonic NDE/SHM; High temperature material state awareness (MSA); Sensing, Sensor development and deployment, big data analytics AI/ML, Digital Twin.
Website: https://research.cec.sc.edu/banerjee

Abdel-Moez E. Bayoumi, Professor (803-777-1845) [bayoumi@cec.sc.edu]
Ph.D., NCSU. Predictive Maintenance; Condition-Based Maintenance (CBM); Design, Manufacturing; Health Monitoring System. Professional Engineer. Website:
https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/bayoumi_abdel.php

Theodore M. Besmann, Professor and Endowed Chair in the General Atomics Center (803-777-9853) [besmann@cec.sc.edu] Ph.D., Pennsylvania State University, 1976. Nuclear fuels, materials, high temperature behavior, thermodynamics, ceramic composites, energy policy. Website:
https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/besmann_theodore.php

Dan G. Cacuci, Endowed Chair Professor and Director, SmartState Center of Economic Excellence in Nuclear Science and Energy (803-777-5316) [cacuci@cec.sc.edu] Ph.D., Columbia University in New York, 1978. Predictive science, sensitivity and uncertainty quantification, model validation, reactor physics and safety. Website: https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/cacuci_dan.php

Fanglin (Frank) Chen, Professor (803-777-4875) [chenfa@cec.sc.edu] Ph.D., Georgia Institute of Technology, 2001. Advanced ceramic materials for nuclear related applications; Porous and dense membranes for gas transport and separation; Tritium separation and sequestration. Website: http://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/chen_frank.php

Frederick L. Dryer, Professor (803-777-9136) [dryerf@mailbox.sc.edu] Ph.D., Princeton University, 1971. National Academy of Engineering, 2021. Thermal sciences (heat transfer, fluid dynamics, physical chemistry, and chemical kinetics); non-petroleum-derived alternative fuels, their production, their chemical kinetic properties, and their ability to address U.S. energy security and reduction in net carbon cycle emissions as well as other pollutant concerns.
Website: https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/dryer.php

Tanvir Farouk, Professor (803-777-3380) [tfarouk@sc.edu] Ph.D., Drexel University, 2009. Plasma, Used Nuclear Fuels, Thermal Hydraulics, Nuclear Fuels Drying and Storage, Multi-physics Modeling, Emission Spectroscopy. Website:
https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/farouk_tanvir.php

Ming Hu, Professor (803-576-7206) [hu@sc.edu] Ph.D., Chinese Academy of Sciences, 2007. AI/machine learning for advanced materials discovery and design; thermodynamics and transport properties of nuclear materials; computational nuclear materials physics and chemistry.
Website: https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/minghu.php

Xinyu Huang, Associate Professor (803-777-6834) [huangxin@cec.sc.edu] Ph.D., Virginia Tech, 2001. Composite materials; mechanical and environmental testing of cladding and structural materials.
Website: https://sc.edu/study/colleges_schools/engineering_and_computing/facultystaff/huang_xinyu.php

Jamil Khan, Professor (803-777-1578) [khan@cec.sc.edu] Ph.D., Clemson, 1988. Heat transfer; fluid dynamics; heat exchanger design, power conversion. Faculty Website:
https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/khan_jamil.php

Michael Sutton, Professor (803-777-7158) [sutton@sc.edu] Ph.D., University of Illinois, Champaign-Urbana, 1981. National Academy of Engineering, 2020. Fracture; fatigue; vision-based measurements; experimental solid mechanics; biomechanics; composite and metallic material characterization. Website:
https://sc.edu/study/colleges_schools/engineering_and_computing/faculty- staff/sutton_michael.php

Yi Wang, Professor (803-777-2252) [yiwang@cec.sc.edu]Ph.D., Carnegie Mellon University, 2005. Computational and data-enabled science and engineering for mechanical and nuclear systems (Multiphysics simulation, real-time and massive data analytics, and systems engineering)
Website: https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/yi_wang.php

Lingyu Yu, Professor (803-777-4902) [yu3@cec.sc.edu] Ph.D., University of South Carolina, 2006. Structural Health Monitoring and Diagnosis. ultrasonic nondestructive evaluation (NDE), sensing and instrumentation.
Website: https://sc.edu/study/colleges_schools/engineering_and_computing/faculty- staff/yu_lingyu.php

Other Faculty

Ruixian Fang, Research Associate Professor (803-777-7193) [fangr@cec.sc.edu] Ph.D., University of South Carolina, 2011. Thermal-hydraulic safety analysis of advanced small modular reactors; Predictive modeling, sensitivity/uncertainty method for critical/subcritical nuclear systems; Heat transfer and fluid flow with phase changes; Applied Computational Fluid Dynamic (CFD); System-level thermal modeling and simulation. Website: https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/fang_ruixian.php

Luther L Hamm, Adjunct Professor (803-725-2520) [luther.hamm@srnl.gov] Ph.D., USC, 1982. Subsurface contaminant transport within the environment. Thermal hydraulic design and analysis of nuclear reactors.

Mark W. Pérès, Adjunct Professor (509-430-2566) [peresm@email.sc.edu] M.S., Washington State University, 1999. Advanced Gen IV and Gen III+ small modular reactor and microreactor design, licensing and operations; Repowering coal-fired power plants and powering data centers with small nuclear reactors; Nuclear Project Management and Engineering Quality Assurance. Website: https://www.sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/mark_peres.php

Juliano Schorne-Pinto, Research Assistant Professor (803-243-8793) [julianos@mailbox.sc.edu] Ph.D., National Polytechnic Institute of Toulouse, 2020. Materials; chemical thermodynamics; nuclear fuels; molten salts; experimental physical chemistry.

Elwyn Roberts, Visiting Professor (803-777-2252) [robertse@cec.sc.edu] Ph.D., University of Sheffield, 1960. Materials performance in nuclear reactors; product design; manufacturing and concurrent engineering. Website: https://sc.edu/study/colleges_schools/engineering_and_computing/faculty-staff/roberts_elwyn.php

Alejandro Rodriguez, Faculty Fellow (803-563-1332) [adr1@email.sc.edu] Ph.D., University of South Carolina, 2023. Computational materials modeling; High-throughput evaluation of mechanical and thermal properties for solids; modeling of complex high-temperature liquids.

James Tulenko, Adjunct Professor. (352-219-3865) [tulenko@gmail.com] Masters in Nuclear Engineering, MIT. Nuclear Fuel Performance.

Nuclear Science and Engineering Research Centers

USC Nuclear Materials Laboratory: USC Nuclear Materials Laboratory: The Nuclear Materials Laboratory at the University of South Carolina is licensed and has the necessary equipment for processing, handling, testing, and characterizing radioactive and pyrophoric materials and has a large amount of experience with uranium- and thorium-based materials. The lab includes two chemical hoods, two radiological hoods, two walk-in radiological hoods, and two inert atmosphere gloveboxes. General metallographic and sample preparation capability is available. Relevant equipment includes high temperature furnaces, analytical balances, presses, ball mill, mercury porosimeter (Quantachrome), helium pycnometer (Micromeritics), inductively coupled plasma-optical emission spectrometric analyzer (Perkin Elmer Avio-200) and fusion oxygen and hydrogen analyzer (Elementrac OH-p2). Simultaneous thermal analysis (TGA, DSC) (Netzsch STA409CD) and two differential scanning calorimeters (Netzsch DSC404DSC and Calvet Pro 830), all used in thermochemical studies of nuclear fuels and materials. Electrical resistivity of samples can be measured using a Cascade Microtech C4S-47/0O four-point probe tip and used in conjunction with a Gamry Reference 600 potentiostat. Hardness testing is done using a Buehler Micromet-1 microhardness tester with diamond indenter. The Electron Microscopy Center (EMC) and X-ray Diffraction Laboratory at the University of South Carolina are available user facilities capable of handling radioactive materials using existing protocols.

Thermal Hydraulics Laboratory: Thermal hydraulic test loops and laboratories are dedicated to studies of enhanced heat transfer, fluid flow, pressure drop, and other phenomena associated with nuclear fuel rods and assemblies.

High Performance Computing: High performance computing facilities are used to analyze and model nuclear reactors, advanced fuel cycles, and advanced nuclear fuels and materials. Modeling and simulation codes and tools are employed for neutronic, thermal hydraulic, computational fluid dynamics (CFD), thermochemical, safety and risk, shielding, and finite element analyses.

Laboratory for Spent Fuel Storage and Handling: The laboratory is equipped with capabilities to test and evaluate the processing, handling and storage of simulated spent fuel with testing conducted on zirconium and aluminum clad fuels. A large vacuum chamber is equipped with instruments for pressure, temperature, relative humidity, optical emission spectroscopy, and thermal imaging. A full scale BWR fuel assembly is installed in the chamber and contains depleted uranium rods along with 12 heater rods used to simulate decay heat of fuel assemblies. A vacuum and gas recirculation network connected to the chamber is capable of simulating vacuum drying and forced circulation drying of nuclear fuel assemblies. A medium sized chamber is equipped for tests involving mock research reactor fuels which have been fabricated from aluminum plates and decay heat is simulated through resistance heaters. A smaller chamber is similarly equipped for testing at a smaller scale. The equipment is used for drying, corrosion, environmental, and mechanical testing related to spent fuel handling and storage and in particular dry cask storage. The chambers and equipment are also used as a testbed for sensors developed for structural health monitoring of storage canisters. Other work includes the study of wireless sensors for measuring temperature, pressure, and gas composition without cask penetrations.

UNIVERSITY OF TENNESSEE, KNOXVILLE

Nuclear Engineering
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Website:http://www.ne.utk.edu

	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	42	47	32
Masters	23	38	33
PhD	16	16	17

Number of Graduates

Graduate Student Enrollment: 44 Masters/ 118 Ph.D.
ABET Accreditation:
Bachelor of Science (BS) Degree in Nuclear Engineering

Nuclear Science and Engineering Faculty

Brian D. Wirth, Department Head and UTK-ORNL Governor's Chair Professor of Computational Nuclear Engineering (865-974-2552) [bdwirth@utk.edu] Ph.D., University of California. Research Interests: computational modeling and measurements of radiation effects in materials, molecular dynamics simulation, nano-materials. Website: https://ne.utk.edu/people/brian-d-wirth/

Kondapa Naidu Bobba, Assistant Professor (865-974-2525) [kbobba@utk.edu) Ph.D., Amrita Vishwa Vidyapeetham, 2018. Research Interests: Molecular Imaging and Radiotheranostic; Fluorescent probes and theranostics; Medicinal chemistry. Website: https://ne.utk.edu/people/kondapa-naidu-bobba/

Sandra Bogetic, Assistant Professor (865-974-7568)[sbogetic@utk.edu] Ph.D., University of California, Berkeley, 2020. Research Interests: development of numerical methods in reactor core analysis; tailoring neutron beams characteristics; high-performance computing; biomedical application (BNCT); and nuclear security and nonproliferation. Website: https://ne.utk.edu/people/sandra-bogetic/

Nicholas R. Brown, Professor and Pietro F Pasqua Fellow (865-974-2525) [nbrown49@utk.edu] Ph.D., Purdue University, 2011. Research Interests: nuclear reactor safety and simulation of reactor and system transients, advanced nuclear fuel and cladding materials, including nuclear fuel safety, assessment and simulation of sustainable nuclear fuel cycles. Website: https://ne.utk.edu/people/nicholas-brown/

Livia Casali, Assistant Professor and Zinkle Fellow (865-974-2525) [lcasali@utk.edu] Ph.D., Max Planck Institute for Plasma Physics/LMU University, Munich, Germany, 2015. Research Interests: Fusion Energy Science; Plasma physics; radiative and detached divertors; divertor optimization and pedestal dynamic; impurity transport and core-edge integration solution to achieve high core performance scenarios with mitigated heat loads in magnetically confined fusion devices. Website: https://liviacasali.com/

Jamie B. Coble, Associate Department Head, Professor, and Southern Company Faculty Fellow (865-974-5048) [jcoble1@utk.edu] Ph.D., University of Tennessee- Knoxville. Research interests: Process monitoring, equipment condition assessment, fault detection, diagnostics, and prognostics. Website: https://ne.utk.edu/people/jamie-b-coble/

David C. Donovan, Assistant Professor and Zinkle Fellow (865-974-0594) [ddonovan@utk.edu] Ph.D. University 0f Wisconsin – Madison. Research interests: Nuclear Fusion Technology, Boundary Plasma Physics, Plasma Diagnostics, Plasma-Material Interactions, Fusion Neutron Generators. Website: https://ne.utk.edu/people/david-c-donovan/

Ivis Chaple Gore, Assistant Professor (865-974-8396) [ichaple@utk.edu] Ph.D. University of Alabama at Birmingham, 2021. Research interests: developing novel radiopharmaceuticals for diagnosis and treatment of various disease states, such as cancer. Website: https://chaplelab.utk.edu/

Howard L. Hall, Professor (865-974-2525) [hhall6@utk.edu] Ph.D., University of California, Berkeley. Research Interests: Nuclear security applications, including proliferation detection, counterproliferation, detection of and response to radiological/nuclear threats, nuclear forensics, radiochemistry, and applications of nuclear-based methods to other security needs (such as explosives detection). Website: http://hall-research.engr.utk.edu/Welcome_to_Professor_Halls_Research_Group.html

Khalid Hattar, Director of the Tennessee Ion Beam Materials Laboratory and Associate Professor (865-974-0679) [khattar@utk.edu] Ph.D., University of Illinois at Urbana-Champaign, 2009. Research interests: Elucidating the response of microstructures to overlapping extreme conditions via combinations of in situ electron microscopy techniques to understand complex radiation environments; utilizing film growth and ion beam modification techniques to produce nanostructured systems with tailored thermal, electrical, and mechanical properties. Website: https://ibml.utk.edu/

Jason P. Hayward, Professor and UCOR Fellow (865-974-2536) [jhayward@utk.edu] Ph.D., University of Michigan. Research interests: Radiation detection and measurement, nuclear security and safeguards, nuclear instrumentation, medical and health physics.
Website: http://www.engr.utk.edu/nuclear/Projects/JPHGrantsContracts-12-09.pdf

Lawrence H. Heilbronn, John D. Tickle Professor (865-974-2525) [lheilbro@utk.edu]Ph.D., Michigan State. Research interests: High-energy neutron production from heavy-ion interactions.

J. Wesley Hines, Postelle Professor and Chancellor's Professor (865-974-6561) [jhines2@utk.edu] Ph.D., Ohio State. Research interests: Diagnostics and surveillance, artificial intelligence methods, expert systems and neural networks. Website:http://www.engr.utk.edu/nuclear/Projects/JWH-Grants10-09.pdf

Michael Howard, Medical Physics Program Director (865-974-2525) [mhoward14@vols.utk.edu] Ph.D., University of Tennessee. Research interests: clinical applications of medical physics. Website: https://ne.utk.edu/people/michael-howard/

Maik K. Lang, Professor and Pietro F. Pasqua Fellow (865-974-2525) [mlang2@utk.edu]Ph.D., University of Heidelberg, Germany. Research interests: Radiation damage and high-pressure studies, materials science. Website: https://ne.utk.edu/people/maik-k-lang/

Eric D. Lukosi, Professor and Charles P Postelle Professor in Nuclear Engineering (865-974-5048) [elukosi@utk.edu] Ph.D., University of Missouri, Columbia. Research interests: Neutron detection and spectrometry, dosimetry, nuclear batteries, applied plasma physics, nuclear physics and cross section evaluations. Website: https://ne.utk.edu/people/eric-d-lukosi/

G. Ivan Maldonado, Professor (865-974-7562) [imaldona@utk.edu] Ph.D.**,** North Carolina State University. Research interests: In-core fuel management, fuel cycle analysis, advanced reactors. Website: https://ne.utk.edu/people/g-ivan-maldonado/

Vladimir Sobes, Assistant Professor and Charles P Postelle Professor in Nuclear Engineering (865-974-7568)[sobesv@utk.edu] Ph.D., Massachusetts Institute of technology, 2013. Nuclear data, methods and codes development for data applications, nuclear criticality safety analysis, artificial intelligence for advanced design. Website: https://ne.utk.edu/people/vladimir-sobes/

Xianfei Wen, Research Assistant Professor (865-974-2525) [xwen5@utk.edu] Ph.D., Oregon State University. Research interests: Active interrogation, neutron scattering instrumentation, neutron imaging, radioactive waste characterization, and nuclear decommissioning. Website: https://ne.utk.edu/people/xianfei-wen/

Richard T. Wood, Professor **(**865-974-8841) [rwood11@utk.edu] Ph.D., University of Tennessee. Research Interests: Digital instrumentation and control (I&C) technology, nuclear power plant I&C systems, safety system regulation, space nuclear power and propulsion, systems engineering, autonomy and control, surveillance and diagnostics, and simulation. Current research activities focus on common-cause failure for embedded digital devices and development of I&C architecture for advanced reactors.

Xingang Zhao, Assistant Professor (865-974-2525) [xzhao47@utk.edu] Ph.D., Massachusetts Institute of Technology. Research interests: Computation thermal hydraulics, prognostics and health management, autonomous control, systems engineering, safety and reliability analysis; AI & ML for nuclear and thermal-fluid systems, digital twin, validation and verification, uncertainty quantification, optimization, high performance computing; Techno-economic analysis, life cycle assessment, hybrid/integrated energy systems. Website: https://ne.utk.edu/people/xingang-zhao/

Steven J. Zinkle, UTK-ORNL Governor's Chair Professor for Nuclear Materials (865-974-4589) [szinkle@utk.edu] Ph.D., University of Wisconsin, Madison. Research interests: Physical metallurgy of structural materials; the effects of ion and neutron irradiation on the microstructure, physical properties, and mechanical properties of metals and ceramics; transmission electron microscopy; and fusion and space fission reactor materials studies. Website: https://zrg.utk.edu/

Other Faculty

Sophie Blondel, Research Assistant Professor (865-974-2525) [sblondel@utk.edu] Ph.D., Paris-Sud University. Research Interests: Developing continuum scale models for irradiated materials and implementing them for high performance computing applications.

Joseph M. Bowling, Adjunct Assistant Professor (865-541-1155) [jbowling@utk.edu] Ph.D., University of Tennessee – Knoxville. Research Interests: Medical Physics, health physics, radiological engineering.

Ondrej Chvala, Research Assistant Professor (865-974-5048) [ochvala@utk.edu] Ph.D., Charles University, Prague, Czech Republic. Research Interests: High performance computing applications to nuclear engineering, reactor core physics, and molten salt based nuclear systems.

David Cook, Associate Professor (865-574-5690) [cookdh@ornl.gov] Ph.D., University of Tennessee, 1984. Research Interests: Reactor safety analysis, research reactor operations and safety, two-phase flow, isotope separations, and radiological source term modeling.

H. L. Dodds, IBM Professor **(**865-974-2525) [utne@utk.edu] Ph.D., UT. Research interests: Reactor core analysis, transient modeling and simulation, reactor safety analysis, advanced reactors, nuclear criticality safety, energy policy. Professional Engineer.
Website: http://web.utk.edu/~hdj/

Andrei Gribok, Research Associate Professor (865-974-2525) [agribok@utk.edu] Ph.D., Moscow Inst of Biological Physics. Research interests: Artificial intelligence techniques, surveillance and diagnosis, Inverse and ill-posed problems, Regularization theory.

Martin L. Grossbeck, Research Professor **(**865-974-2525) [mgrossbe@utk.edu] Ph.D., University of Illinois. Research interests: Radiation effects in materials, burnable absorbers, research reactors, and ultra-high vacuum technology.

Samantha Hedrick, Adjunct Assistant Professor (573-220-8392)[samantha.hedrick@provisionproton.com} Ph.D., Washington University School of Medicine Research interests: Medical Physics treatment planning, quality assurance and clinical development

Richard H. Howard, Adjunct Assistant Professor (865-974-7568)[rhowar16@utk.edu] Ph.D., University of Tennessee, Knoxville, 2019. Radioisotope, nuclear fuels, and materials.

Alan S. Icenhour, Adjunct Professor (865-576-5315) [aicenhou@utk.edu] Ph.D., University of Tennessee-Knoxville. Research Interests: Radiochemical processing, nuclear fuels, isotope and radioisotope production, reactor and nuclear facility operations, radioactive waste management, and nuclear security.

Richard "Chip" H. Lagdon, Professor of Practice (703-429-6534)[rlagdon@utk.edu] MEA, George Washington University, 1987.

Michael J. Leisenfelt, Research Assistant Professor (865-974-2525)[mlesenf@utk.edu] Ph.D., University of Florida, 2016. Advanced imaging technologies including high speed active interrogation for security nonproliferation, industrial non-destructive testing/inspection/evaluation, medical imaging, Compton scatter radiographic methods, dual/multi energy methods, ray-tracing physics based computed tomography, radiation detection, system integration, and high performance CPUGPU data processing.

Charles L. Melcher, Research professor (865-974-0254) [cmelcher@utk.edu] Ph.D., Washington University of St. Louis. Research interests: Radiation detection, gamma-ray spectroscopy, new materials for radiation sensors, crystal growth, implementation of emerging scintillator technology in medical imaging and nuclear security

John T. Mihalczo, Research Professor (865-974-2525) [maccat15@comcast.net] Ph.D., University of Tennessee, Knoxville. Research interests: radiation measurements for nuclear safeguards and nuclear criticality safety, reactor physics

Laurence F. Miller, Professor Emeritus **(**865-974-5048) [lfmiller@utk.edu] Ph.D., Texas A&M. Research interests: Particle and radiation transport, diagnostics and surveillance, waste management, health physics, modeling and simulation, instrumentation and control. Professional Engineer.

Eric O'Quinn, Research Assistant Professor (865-974-2525) [ericoquinn@utk.edu] Ph.D., University of Tennessee – Knoxville. Research Interests: structure, energetics, and properties of disordered materials, with a particular emphasis on materials under extreme conditions.

Ronald E Pevey, Professor of Practice **(**865-974-2525) [lfmiller@utk.edu] Ph.D., Mississippi State University. Research interests: reactor physics, thermal hydraulics, computer methods development, shielding, nuclear criticality safety. Professional Engineer.

Louis Qualls, Adjunct Professor (865-974-7568)[lou.qualls@comcast.net] Ph.D., University of Tennessee. Molten salt reactors, thermal nuclear propulsion, advanced reactor systems.

Chester R. Ramsey, Adjunct Assistant Professor (865-974-2525) [cramsey@utk.edu] Ph.D., University of Tennessee-Knoxville. Research Interests: Medical Physics, health physics, radiological engineering.

Jun Ren, Research Assistant Professor (865-974-2525) [rjun@utk.edu] Ph.D., Institute of Plasma Physics Chinese Academy of Sciences, Anhui, China. Research Interests: Develop state-of-the-art boundary diagnostics to measure target heat flux; characterize the heat flux profile in the fusion device, understand the divertor physics and improve heat flux movement; Achieve high-performance operating scenarios integrated with high-power exhaust solutions in fusion devices by improving power dissipation in the divertor region; test advanced materials to address the power-removal problem and suppress impurities generated by the process of Plasma-Surface Interaction (PSI); and improve core plasma performance through wall conditioning, including lithium evaporation and power injection.

Arthur E. Ruggles, Professor (865-974-2525) [aruggles@utk.edu] Ph.D., RPI. Research interests: Reactor thermal hydraulics, liquid metal flow and heat transfer, cavitation and fluid transients, accelerator target design and microchannel flow.

Steven S. Skutnik, Joint Faculty Associate Professor (865-974-2525) [sskutnik@utk.edu] Ph.D., North Carolina State University. Research interests: nuclear security applications, including proliferation detection and counter-proliferation; advanced nuclear fuel cycles and waste management; modeling and simulation. Website: https://ne.utk.edu/people/steven-e-skutnik/

Ashley C. Stowe, Assistant Professor (865-974-2525) [astowe1@utk.edu] M.S., Florida State University. Research interests: Radiation detection and instrument development.

Luis Stand Stracuzzi, Research Assistant Professor (865-974-2525) [lstand@vols.utk.edu] Ph.D., University of Tennessee – Knoxville. Research Interests: development of advanced crystal growth techniques for rapid screening of new compounds and for growth from the melt of high-quality high-performance large single crystal scintillators.

Lawrence W. Townsend, Chancellor's Professor and Robert M. Condra Professor Emeritus (865-974-7569) [ltownsen@utk.edu] Ph.D., Idaho. Research interests: Radiation physics, transport, shielding and risk assessment; Nuclear and Radiological engineering; Theoretical nuclear physics.

Belle R. Upadhyaya, Professor Emeritus (865-974-7576) [bupadhya@utk.edu] Ph.D., University of California, San Diego. Research interests: Dynamics, instrumentation and control, monitoring and diagnostics, advanced signal processing, next generation reactors, autonomous control of space reactors, nondestructive examination, reliability and maintainability engineering. Professional Engineer. Website: http://web.utk.edu/~bru/

UNIVERSITY OF TEXAS at AUSTIN

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	7/21-6/22	7/22-6/23	7/23-6/24
Masters	10	8	11
PhD	6	4	7

Number of Graduates

Graduate Student Enrollment: 76
ABET Accreditation: Bachelor of Science (BS) Degree in Mechanical Engineering

Distance Education Program
Nuclear Engineering Courses for MS and PhD Degrees
http://nuclear.engr.utexas.edu/distance-learning

Nuclear Science and Engineering Faculty

William Charlton, John J. McKetta Energy Professor and Director, Nuclear Engineering Teaching Laboratory (865-406-1502) [wcharlton@austin.utexas.edu] Ph.D., Texas A&M University, 1999. Nuclear security; nuclear nonproliferation; nuclear detection; nuclear forensics; nuclear policy; reactor physics.
Website: http://www.me.utexas.edu/people/faculty-directory/charlton

Kevin Clarno, Associate Professor (865-406-1502) [clarno@utexas.edu] Ph.D., Texas A&M University, 2002. Multiphysics coupling methods, neutronics; fuel performance; design, optimization, analysis of advanced commercial and test reactor concepts, digital twin reactors.
Website: http://www.me.utexas.edu/people/faculty-directory/clarno

Derek Haas, Associate Professor (512-468-3871) [derekhaas@utexas.edu] Ph.D., University of Texas at Austin, 2008. Radiation detection for nuclear arms control and non-proliferation; fundamental physics of radioactive decay processes; fission yields; detection techniques; molten salt and digital twin reactors.
Website: http://www.me.utexas.edu/people/faculty-directory/haas

Dale Klein, Professor (202-731-6797) [dale.klein@utexas.edu] Ph.D., University of Missouri Columbia, 1977. Nuclear power sustainability, nuclear regulations; nuclear nonproliferation.
Website: http://www.me.utexas.edu/people/faculty-directory/klein

Sheldon Landsberger, Professor Robert B. Trull Chair in Engineering (512-796-0287) [s.landsberger@mail.utexas.edu] Ph.D., University of Toronto, 1982. Nuclear Instrumentation; nuclear forensics. Website: https://www.me.utexas.edu/people/faculty-directory/landsberger

Mitch Pryor, Research Professor (512-471-5182) [mpryror@utexas.edu] Ph.D., University of Texas, Austin, 2002. Robotics hazardous areas with special nuclear materials; design; controls, decision making. Website: https://robotics.me.utexas.edu/people

Elena Zannoni, Assistant Professor (217-377-1216) [elena.zannoni@austin.utexas.edu] Ph.D. University of Illinois, 2021.Development of nuclear medicine imaging instrumentation and data analysis techniques for advanced applications in radiological science and molecular imaging.
Website: https://www.me.utexas.edu/people/faculty-directory/zannoni

Other Faculty and Researchers

Robert Blake Anderson, Research Scientist (432-770-6028) [blakeanderson@utexas.edu] Ph.D., The University of Texas at Austin, 2020. Mobile robotic systems; autonomous radiation surveying; radioactive source localization; optimization of rob measurements; robot task planning.
Website: https://robotics.me.utexas.edu/people

Benjamin Collins, Senior Research Fellow (734-764-4260) [collins.bs@gmail.com] Ph.D., University of Michigan, 2011. Computational nuclear engineering, digital twin reactors.
Website: https://www.nuclear.engr.utexas.edu/people/staff

Ondrej Chavla, Senior Research Fellow (203-444-7828) [ochvala@utexas.edu] Ph.D., Institute of Particle and Nuclear Physics Charles University in Prague, Czech Republic, 2007. Computational nuclear engineering. Website: https:// www.nuclear.engr.utexas.edu/people/staff

Nicholas Herring, Postdoctoral Fellow (336-740-1067) [nfherring@utexas.edu] Ph.D., University of Michigan, 2022. Computational nuclear engineering, digital twin reactors.
Website: https://www.nuclear.engr.utexas.edu/people/staff

Desiderio Kovar, Professor, Materials Science and Engineering (512-471-5185) [dekovar@austin.utexas.edu] Ph.D., Carnegie Mellon University, 1995. Microstructure/property relationships in ceramics; metals, composites; additive manufacturing.
Website: https://www.me.utexas.edu/ faculty/faculty-directory/kovar

Joseph Lapka, Research Fellow (530-219-9185) [joseph.lapka@austin.utexas.edu] Ph.D., Oregon State University, 2013; Nuclear fuel reprocessing; actinide and lanthanide chemistry, aqueous and organic solution chemistry. Website: https:// www.nuclear.engr.utexas.edu/people/staff

Don Nolting, Research Scientist, Nuclear Engineering Teaching Laboratory (615-491-3032) [don.nolting@utexas.edu] Ph.D., University of Iowa, 2005. IMR, PET, SPECT, and Optical imaging contrast agent design, synthesis, and purification; radiochemical syntheses using F-18, Cu-64, Tc-99m, and In-111 isotopes. Website: https://www.nuclear.engr.utexas.edu/people/staff

Nuclear Science and Engineering Research Centers

Nuclear Engineering Teaching Laboratory (NETL): The J.J. Pickle Research Campus, a separate research center of the University of Texas, features a 1.1 Megawatt TRIGA reactor. Areas of study include health physics, radiation engineering, research reactor beam port experiments, environmental radioactive waste management, reactor and computational nuclear engineering, and nuclear forensics. NETL also houses a 14 MeV neutron generator, 2 Pu(Be) sources, one Compton suppression germanium system, gamma-gamma coincidence, prompt gamma activation analysis, and radiochemistry and neutron activation analysis laboratories and other multiple detectors.

Advanced Radiological Imaging and Instrumentation Laboratory: Research efforts focus on the development of nuclear medicine imaging instrumentation and data analysis techniques for advanced clinical and preclinical applications in radiological science and molecular imaging.

Nuclear and Applied Robotics Laboratory: Advanced research in efforts to deploy robotics in hazardous, uncertain environments to perform manufacturing and special nuclear material handling.

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	7/21-6/22	7/22-6/23	7/23-6/24
Masters			
PhD			

Number of Graduates

Graduate Student Enrollment: *Not Reported*
ABET Accreditation: Civil Engineering

Nuclear Science and Engineering Faculty

Michael Barber, Director, Professor and Chair (801-581-6931) [barber@civil.utah.edu] Ph.D., University of Texas at Austin, 1991. Water Resources Engineering; Water Quality; and Climate Change Impact on Water Resources; Field Investigations and Numerical Modeling Studies. Website: www.nuclear.utah.edu/director

Edward Cazalas, Assistant Professor (801-581-7397) [edward.cazalas@utah.edu] Ph.D., Pennsylvania State University, 2015. Radiation detection; radiation effects; instrumentation and electronics.

Tara Mastren, Assistant Professor (801-581-7277) [tara.mastren@utah.edu] Ph.D., Washington University in St. Louis, 2014. Radiochemistry; Nuclear Medicine; Lanthanide and Actinide Separations; Neutron Activation Analysis. Website: https://themastrenlab.sitey.me/

Luther McDonald IV, Associate Professor (801-581-7768) [luther.mcdonald@utah.edu] Ph.D., Washington State University, 2012. Radiochemistry; Nuclear Forensics; Nuclear Materials.
Website: www.mcdonald-radiochemistry-research.com

Michael F. Simpson, Professor (801-581-4013) [michael.simpson@utah.edu] Ph.D., Princeton University, 1996. Nuclear fuel cycle technology; molten salt chemistry; nuclear safeguards; electrochemical analysis and separations. Website: https://faculty.utah.edu/u0907827-MICHAEL_F_SIMPSON/research/index.hml

Glenn Sjoden, Professor (801-581-8874) [glenn.sjoden@utah.edu] Ph.D., Pennsylvania State University, 1997. Non-proliferation, reactor research, and power engineering. Professional Engineer.

US MILITARY ACADEMY

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	7/21-6/22	7/22-6/23	7/23-6/24
BS	14	20	23
Masters	0	0	0
PhD	0	0	0

Number of Graduates

ABET Accreditation:
Bachelor of Science (BS) Degree in Nuclear Engineering

Nuclear Science and Engineering Faculty

Dr. Kenneth S. Allen, Professor and Deputy Department Head, Nuclear Engineering Program Director, (845-938-3014) [Kenneth.allen@westpoint.edu] Ph.D., University of South Carolina, 2011. Computational Design of Nuclear Systems, MCNP, SCALE, microreactors for Army Ground Operations, alpha- voltaic cells for low-voltage power sources, radiation waste transmutation and management.

Dr. Joseph L. Bottini, Assistant Professor (845-938-4787) [joseph.bottini@westpoint.edu] Ph.D., University of Illinois at Urbana-Champaign, 2022. Experimental thermal hydraulics, multiphase flow, Two-Fluid Model, critical heat flux, microreactors. Website: https://www.westpoint.edu/physics-and-nuclear-engineering/profile/joseph_bottini

LTC Jill Rahon, Assistant Professor, Research Program Director (845-709-1215) [jill.rahon@westpoint.edu] Ph.D., Massachusetts Institute of Technology, 2024. Radiation detection, protection, and shielding; neutron and mixed-field detection; health physics; radiography; nuclear resonance analysis; accelerators; nuclear materials assay; decontamination; radiological decommissioning and waste management.

LTC Andrew W. Decker, Director of the DTRA Nuclear Science and Engineering Research Center (845-938-0093) [andrew.decker@westpoint.edu] Ph.D., University of Tennessee, Knoxville, 2021. Radiation detection, organic scintillators, dual particle radiography, MCNP, radiation protection factor research.

MAJ David Fobar, Assistant Professor and Deputy Director Nuclear Science and Engineering Research Center(845-938-0532) [david.fobar@westpoint.edu] M.S., University of Michigan, 2018. Radiation detection; applications of machine learning to radiation search algorithms.

MAJ Kyle W. Carberry, Instructor (845-938-4297) [kyle.carberry@westpoint.edu] M.S., Georgia Institute of Technology, 2022. Radiation Shielding Analysis, Molten Salt reactor technologies, Monte Carlo Simulation Methods and Modeling.

US NAVAL ACADEMY

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	17	20	25

Number of Graduates

ABET Accreditation: Nuclear Engineering

Nuclear Science and Engineering Faculty

Mark Murray, Professor and Nuclear Engineering Program Director (410-293-6451) [mmmurray@usna.edu] Ph.D., Duke University, 2000. Reactor plant operations, dosimetry, radiation detection, heat transfer and fluid flow. Professional Engineer.

Brian Earp, Assistant Professor and Permanent Military Professor (410-293-6432) [earp@usna.edu] Ph.D., Naval Post-Graduate School, 2020. Materials – Microscopy.

Elizabeth Getto, Assistant Professor (410-293-6506) [getto@usna.edu] Ph.D., University of Michigan, 2016. Nuclear materials; Ion irradiation effects in materials; Reactor structural materials.

Joseph Latta, Assistant Professor (410-293-6537) [jlatta@usna.edu] Ph.D., Colorado School of Mines 2022 Radiation detector development; additive manufacturing; reactor plant design; radiation hardened electronics.

Stephen McHale, Assistant Professor (410-293-6495) [mchale@usna.edu] Ph.D., Air Force Institute of Technology, 2011. Radiation transport and shielding; Nuclear weapons effects; Neutron imaging and activation analysis.

Angel F. Rodriguez, Assistant Professor (917-923-2345) [arodrigu@usna.edu] Ph.D., University of California, Berkeley, 2022. Fluids, Thermal Hydraulics, Multiphase Flows.

Other Faculty

Martin E. Nelson, Professor Emeritus (410-293-6427) [nelson@usna.edu] Ph.D., University of Virginia**,** 1972**.** Dosimetry, radiation detection and measurement, radiation effects on microelectronics, radiation transport. Professional Engineer.

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Graduate Student Enrollment: 77 Masters/ 49 Ph.D.
ABET Accreditation: Bachelor of Science (BS) Degree in Mechanical Engineering

Nuclear Science and Engineering Faculty

Zhongquan "Charlie" Zheng, Department Head and Professor (435-797-2878) [zzheng@usu.edu] Ph.D., Old Dominion University, 1993. Vortex dynamics, CFD, heat transfer, turbulent flow, aeroacoustics, and biofluiddynamics.

Ryan Berke, Associate Professor and Director of USU's Thermal Hydraulics and Materials Properties (TMP) Center (435-797-8184) [ryan.berke@usu.edu] Ph.D., The Ohio State University, 2013. Experimental solid mechanics for extreme temperature environments, digital image correlation at high magnifications and long working distances. Websites: www.berkelab.com and nuclear.usu.edu.

Som Dutta, Assistant Professor (435-797-0329) [som.dutta@usu.edu] Ph.D., University of Illinois, Urbana-Champaign, 2016. Computational fluid dynamics, particle flow.

Thomas Fronk, Associate Professor and Associate Dean of the College of Engineering (435-797-0116) [Thomas.fronk@usu.edu] Ph.D., Virginia Tech, 1991. Composite structures, numerical solutions, finite elements, vibrations.

Nadia Kouraytem, Assistant Professor (435-797-6364) [nadia.kouraytem@usu.edu] Ph.D., King Abdullah University of Science and Technology (KAUST), 2016. Investigating the process-structure-property relationships of metal additive manufacturing using advanced experimental characterization techniques for applications in extreme environments.

Juhyeong Lee, Assistant Professor (435-797-0329) [juhyeong.lee@usu.edu] Ph.D., Mississippi State University, 2017. Damage mechanisms due to thermal-electrical-mechanical coupling, effects of lightning strikes on composites. Website: https://sites.google.com/view/mscim

Nick Roberts, Associate Department Head and Associate Professor (435-797-9455)[nick.roberts@usu.edu] Ph.D., Vanderbilt University, 2010. Direct energy conversion and storage, materials, nanotechnology, thermal transport. Website: http://ntel.go.usu.edu

Barton Smith, Professor (435-797-8147) [barton.smith@usu.edu]. Ph.D., Georgia Tech,1999. Experimental fluid mechanics, validation benchmark simulations for CFD, particle image velocimetry uncertainty, flow control applied to materials processing.
Website: http://efdl.neng.usu.edu/EFDL/EFDL_Home.html

Yanqing Su, Assistant Professor (435-797-0957) [yanqing.su@usu.edu] Ph.D., Georgia Institute of Technology, 2017. Computational fluid/solid mechanics, multi-scale simulations formaterials under extreme environment. Website: https://yanqingsu.github.io/

Dae Han Sung, Assistant Professor (435)797-2952 [daehan.sung@usu.edu] Ph.D., University of Delaware, 2023. Multiscale Composites Materials, Nanocomposites, Multifunctional Applications, Composite Interface Modification, Polymer Matrix Composites, Manufacturing/Design/Characterization.

Elizabeth Vargis, Associate Professor (435-797-0618) [elizabeth.vargis@usu.edu] Ph.D., Vanderbilt University, 2012. Health physics, tissue engineering, effects of radiation on cardiac and skeletal muscle. Website: www.vargislab.com

Hailei Wang, Associate Professor (435-797-2098) [hailei.wang@usu.edu] Ph.D., Oregon State University, 2006. Nuclear integrated energy systems; thermal hydraulics; heat transfer and heat exchangers. Website: https://engineering.usu.edu/mae/faculty/hailei-wang/

Haoran Wang, Assistant Professor (435-797-0951) [haoran.wang@usu.edu] Ph.D., University of Illinois, Urbana-Champaign, 2017. Solid mechanics and materials, multiscale computations, uncertainty quantification, data-driven modeling.
Website: https://sites.google.com/site/haoranwangsresearch/

Nuclear Science and Engineering Research Centers

Thermal Hydraulics and Materials Properties (TMP) Center: Dr. Ryan Berke, Director. Located 140miles south of INL, USU has emerged to play a major role regionally in nuclear engineering research and education. TMP currently has 11 active research faculty with interests grouped into two core strengths: materials characterization and thermal hydraulics. http://nuclear.usu.edu/

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	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	5	8	8
Masters	15	17	15
PhD	6	6	7

Number of Graduates

Graduate Student Enrollment: 80 Masters/ 46 Ph.D.
ABET Accreditation: B.S. in Mechanical Engineering, with a Nuclear Concentration

Nuclear Science and Engineering Faculty

Supathorn Phongikaroon, Engineering Foundation Professor and Director of Nuclear Programs (804-827-2278) [sphongikaroon@vcu.edu] Ph.D., University of Maryland, 2001. Electrochemical and chemical separation for used nuclear fuel reprocessing, molten salt systems, pyroprocessing technology, laser-induced breakdown spectroscopy. Professional Engineer.

Lane Carasik, Assistant Professor (804-828-9117) [lbcarasik@vcu.edu] Ph.D., Texas A&M University, 2017. Thermal-hydraulics, advanced reactor design and simulation, advanced energy systems including nuclear fusion/fission and concentrated solar power.

Braden Goddard, Associate Professor (804-827-7029) [bgoddard@vcu.edu] Ph.D., Texas A&M University, 2013. Nuclear security and counter terrorism, nonproliferation and international safeguards, radiation detection and measurements, environmental measurements and assay.

Gennady Miloshevsky, Associate Professor (804-828-9117) [gennady@vcu.edu] Ph.D., Heat and Mass Transfer Institute of the National Academy of Sciences of Belarus, 1998. Computational physics; shielding of space radiation; fission SNM sources; plasma physics and atomic spectra; CFD; two-fluid liquid metal plasma flows; warm dense matter.

Jessika Rojas, Associate Professor (804-828-7126) [jvrojas@vcu.edu] Ph.D., Missouri University of Science & Technology, 2014. Nuclear materials, radiation induced synthesis of nanomaterials, medical applications of radiation.

Gary Tepper, Professor and Senior Associate Dean for Academic and Faculty Affairs (804-827-4079) [gctepper@vcu.edu] Ph.D., University of California, San Diego, 1993. Radiation detection and measurement, sensor design, nanoscale materials.

Zeyun Wu, Associate Professor (804-827-0237) [zwu@vcu.edu] Ph.D., Texas A&M University, 2010. Reactor Physics; Reactor core design and analysis; Computational methods for neutron transport; Uncertainty and sensitivity analysis. Website: https://egr.vcu.edu/directory/zeyunwu/

Other Faculty

Carlos Castano, Associate Professor (804-828-1998) [cecastanolond@vcu.edu] Ph.D., Missouri University of Science and Technology, 2014. Surface Engineering; Functional Coatings; Nanomaterials Engineering; Corrosion Engineering; Plasma Physics; Advanced Materials Characterization.
Website: https://expertfile.com/experts/carlos.castanophd

Carl Elks, Associate Professor (804-828-8222) [crelks@vcu.edu] Ph.D., University of Virginia, 2005. Resilient Cyber Physical Systems; Systematic SW testing; Runtime Verification and Monitoring; Fault injection; Cyber threat and vulnerability, and modernization strategies for energy and utility infrastructures, especially for Nuclear Power Plants. Website: https://expertfile.com/experts/carl.elksphd

Ibrahim Guven, Associate Professor (804-827-3652) [iguven@vcu.edu] Ph.D., University of Arizona, 2000. Fracture and failure analysis using Peridynamics; Impact and penetration mechanics; Multi-scale modeling of physical phenomena; Micro/nano-scale testing and measurement techniques.
Website: https://expertfile.com/experts/ibrahim.guvenphd

Milos Manic, Professor (804-827-3999) [misko@vcu.edu] Ph.D., University of Idaho, 2003. Computational Intelligence Techniques (Machine Learning) with Applications in Energy Cybersecurity and Human Machine Interfaces; Software Defined Networks; Fuzzy Neural Data Mining Techniques; Energy Security; Human machine Interfaces. Website: https://expertfile.com/experts/milos.manicphd

Nuclear Science and Engineering Research Centers

Specialized nuclear engineering laboratories include the VCU Radiation Detection and Measurement Laboratory, the VCU Radiochemistry Laboratory, the VCU Laser Spectroscopy Laboratory, the Advanced Nuclear Modeling and Simulation Laboratory, the NanoNuclear and Radiation Effects Laboratory, the Nuclear Security and Nonproliferation Laboratory, the Microsensor and Radiation Detector Laboratory, and the VCU Nuclear Simulator. Other relevant research centers within the VCU School of Engineering include the Institute for Engineering and Medicine, the VCU Nanomaterials Core Characterization Center, the VCU da Vinci Center for Innovation and the Wright Virginia Microelectronics Center.

VCU-NE Programs recently established two new centers through the funding support from Department of Energy's Integrated Research Project and Isotope Production Program; these are "Research, Education and Training Center of Excellence for Nuclear Fuel Cycle and Waste Technology towards Advanced Reactor Designs" and "Minority Serving Institutions for Manufacturing Sustainable Isotopes and Mainstreaming Scientific Inclusion (MSI3)."

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
(Virginia Tech)

Nuclear Engineering Program, Mechanical Engineering Department
445 Goodwin Hall (0238)
635 Prices Fork Road Blacksburg, Virginia 24061
703-538-3790

Greater Washington DC Area (GWDCA) Campus, Virginia Tech Research center
900 N. Glebe Road
Arlington, VA 22203

Director: Alireza Haghighat (haghighat@vt.edu)
Program Coordinator: Alison Jones (arjones@vt.edu)
Website: https://me.vt.edu/for-students/nuclear-engineering.html

Number Graduates

	7/21-6/22	7/22-6/23	7/23-6/24
Undergraduate Minor	26	26	26
Masters	2	5	9
Ph.D.	1	3	3

Graduate Student Enrollment: 14 Masters/ 13 PhD

Distance Education Program
Offers Nuclear Engineering Courses Online

Nuclear Engineering Faculty

Alireza Haghighat, Program Director, Robet E. Hord, Jr. Endowed Professor (352-871-1099) [haghighat@vt.edu] Ph.D., University of Washington, 1986. Research in Advanced particle transport methods (deterministic and statistical Monte Carlo) and their applications in reactor physics analysis and design, radiation shielding, nuclear security and safeguards, and medical imaging; multi-physics analysis for advanced reactor design and simulation; perturbation methods; virtual reality visualization; parallel computing; physics-informed AI/ML (Located at the GWDCA campus). https://nuclear.ncr.vt.edu/about/people/alireza-haghighat.

David Freeman, Collegiate Associate Professor [davidf1@vt.edu] Ph.D., University of Missouri-Rolla, 1998. Accelerator Safety, Neutron Scattering Instrumentation, Neutron Target and Cryogenic Hydrogen Moderator Systems, and nuclear reactor operation.

Amanda Leong, Research Assistant Professor (614-843-8934) [aleongsw@vt.edu] Ph.D., Virginia Tech, 2022. Materials Characterization (Combustion Analysis, Inert Gas Fusion, Inductively Couple Plasma-Mass Spectrometry, X-ray Diffraction, Scanning Electron Microscopy, X-ray Photoelectron Spectroscopy, Ultraviolet-visible spectroscopy, Thermal analysis); Applied Mathematics in Nuclear Engineering.

Yang Liu, Associate Professor (540-231-8068) [liu130@vt.edu] Ph.D., Purdue University, 2008. Nuclear thermal hydraulics and reactor safety; Two-phase flow modeling, instrumentation and experiment; Two- phase flow computational fluid dynamics; Advanced passive safety system design. Website: https://sites.google.com/a/vt.edu/vtmftl/

Jinsuo Zhang, Professor (540-231-1988) [zjinsuo@vt.edu] Ph.D., Zhejiang University, 2001, Nuclear materials compatibility (materials corrosion/degradation); Nuclear fuel materials (metallic fuel, fuel-cladding chemical interactions, fuel-coolant interactions); Nuclear fuel cycle technology (pyroprocessing); Electrochemical separation; Nuclear safeguards and nonproliferation; Advanced coolant materials (molten salt, liquid metal).

Affiliate/Adjunct Faculty

Patrick Huber, Professor of Physics (540-231-8727), [pahyber@vt.edu) Ph.D., Technische Universität München, Theoretical Physics, Numerical methods to accurately and efficiently predict physics sensitivities of yet to be built experiments, theoretical analysis of neutrino physics.

Johnathan Link, Professor of Physics & Director of Center for Neutrino Physics (540-231-5321) [jonathan.link@vt.edu] Ph.D., University of California at Davis. Leading the development of the CHANDLER antineutrino detection system for application to power reactor safeguards.

Roop Mahajan, Lewis A. Hester Chair in Engineering, Professor of Mechanical Engineering (571-858-3355) [mahajanr@vt.edu] Ph.D., Cornell University, 1977, Advanced Electronic Cooling; Two-Phase Flows; Porous Media; Synthesis and application of graphene and its derivatives and composites; Biomedical Devices; Emerging and Black Swan Technologies; Cross-cutting technologies for sustainable communities; Next generation engineering curriculum.

Ranga Pitchumani, George R. Goodson Professor of Mechanical Engineering (571-858-3251) [pitchu@vt.edu], Ph.D., Carnegie-Mellon University, 1992. Research in Energy Systems; Energy/Water Nexus; Electric Grid Integration of Renewable Energy; Materials Processing and Manufacturing; Uncertainty Quantification and Large-Scale Optimization; and, Micro and Nanoscale Technologies.

Patrick Roberts, Associate Professor of School of Public and International Affairs (202-599-0562) [robertsp@vt.edu], Ph.D., Government, University of Virginia, 2006. Research in Emergency management in government; Development of disaster and security organizations and their capacity; Organizational autonomy; and Current global security threats.

Sonja Schmid, Professor of Science and Technology in Society (703-538-8482) [sschmid@vt.edu] Ph.D., Cornell University, 2005. Nuclear security and safeguards; S&T policy; emergency response; energy policy in international perspective.

Luka Snoj, Head of Reactor Physics Division of Jozef Stefan Institute, Professor of Nuclear Engineering at the Ljubljana University (LU), Slovenia (luka.snoj@ijs.si). Ph. D., LU. His research interest is mainly theoretical reactor physics related to practical applications in power and research reactors, in particular: Monte Carlo transport of neutrons and photons in fission and fusion nuclear reactors, integral reactor experiments, criticality experiments and calculations.

Danesh Tafti, W. S. Cross Professor, Mechanical Engineering Department (540-231-9975) (dtafti@exchange.vt.edu). Ph.D., Pennsylvania State University, 1989. Develop and apply large-scale high performance simulation tools to a wide range of physical phenomena in the fluid-thermal sciences; applications include internal and external cooling of turbine vanes and blades, heat transfer enhancement surfaces in compact heat exchangers, fluidized beds, cardio-vascular flows, cooling of reactor reflector regions and in-core self-powered neutron detectors, aerodynamics of flapping flight for Micro-Air Vehicle (MAV) applications, CO2 capture, microfluidics, and flows in solid rocket motors.

Michael von Spakovsky, Robert E. Hord Jr. Professor of Mechanical Engineering (540-231-6684) [vonspako@vt.edu] Ph.D., Georgia Institute of Technology, 1986. Research is in areas of theoretical and applied non-equilibrium and equilibrium thermodynamics with two principal focuses: i) intrinsic quantum thermodynamics (IQT) and its mathematical framework steepest-entropy-ascent quantum thermodynamics (SEA-QT) and ii) SEA non-equilibrium thermodynamics (SEA-NT).

Nuclear Science and Engineering Research Centers

Center for Nuclear Materials and Nuclear Fuel Cycle (NMFC): Director, Jinsuo Zhang [zjinsuo@vt.edu] (540-231-1988). Research activities including liquid metal and molten salt coolant chemistry and control, material corrosion by liquid metal, high temperature water and molten salt and corrosion control, electrochemical separation for spent fuel treatment, metallic nuclear fuel and fuel/cladding chemical interactions. The center current has a molten chloride salt loop, two high-temperature loops, electrochemical cells for high/room temperature corrosion studies, six electrochemical potentiostat for molten salt chemistry studies, three glovebox systems for providing inert conditions for experiments with chemistry control.

MARS - Center for Multiphysics for Advanced Reactor Simulation: Director, Alireza Haghighat [haghighat@vt.edu] (703-538-3795) The vision of MARS is to establish itself as the Center for the development of detailed Multiphysics algorithms and simulation tools capable of design and safety analysis of advanced and innovative reactors in real-time. This will be accomplished by combining a team of professors (both domestic and international) with different backgrounds (such as reactor physics, reactor thermal-hydraulics, material science, and chemistry), and private organizations. (https://gemi.ictas.vt.edu/research/s3npower.html)

Multiphase Flow and Thermal-hydraulics Laboratory (MFTL): Director, Yang Liu [liu130@vt.edu] (540- 231-8068) Research activities include two-phase flow visualization and measurement, advanced conductivity probe, fast X-ray flow imaging system, particle image velocimetry, measurement uncertainty quantification, bubble, drop and film dynamics, multi-group two-fluid model, interfacial area transport equation, computational fluid dynamics, interface resolved simulation, two-phase flow induced vibration, passive safety system design, reactor safety analysis. (https://sites.google.com/a/vt.edu/vtmftl/)

Virginia Tech Transport Theory Group (VT^3G): Leader, Alireza Haghighat [haghighat@vt.edu] (352-871-1099) VT^3G is engaged in development of hybrid 3-D, multi-scale, parallel particle transport algorithms and codes, and their application to nuclear energy, nuclear security and non-proliferation and radiation therapy and diagnosis; development virtual reality systems for particle transport simulation. (http://nsel.ncr.vt.edu/vt3g.html)

Virginia Innovative Nuclear (VIN) Hub: A nonprofit profit organization formed by 4 Virginia universities including Virginia Tech, Virginia Commonwealth University, University of Virginia, and Liberty University with partnership with the Virginia Nuclear industry represented by the Virginia Nuclear Energy Consortium (VNEC) nonprofit. Prof. Haghighat is the Chief Scientific Officer of this organization that its mission includes nuclear workforce, public engagement, and applied and basic R&D.

Unique Educational Programs

In 2021, a Memorandum of Understanding (MOU) with the Jozef Stefan Institute led to the establishment of a graduate course on "Experimental Reactor Physics." This course requires Virginia Tech students to spend three months at JSI, where they conduct 11 experiments at the TRIGA research reactor and gain familiarity with its operation. This course is taught by adjunct Professor Luka Snoj, who is the Head of Reactor Physics Division at JSI.

Accelerated Master of Engineering in Nuclear Engineering for the US Naval Academy midshipmen.

Graduate Certificate in Nuclear Science, Technology, and Policy (NSTP) is offered in collaboration with the Department of Science, Technology and Society (STS) and the School of Public and International Affairs (SPIA). This certificate is available to all students from engineering, science, and policy-related fields. It provides an opportunity to explore technical issues and policy matters while addressing major challenges in nuclear technology.

UNIVERSITY OF WISCONSIN, MADISON

Nuclear Engineering and Engineering Physics Program
1500 Engineering Drive
151 Engr. Research Building
Madison, WI 53706
608-263-1646
FAX: 608-263-7451
Administrative Contact:
Samantha Vold-Miller
608-262-8367
savold@wisc.edu
Website: engr.wisc.edu/neep

	7/21-6/22	7/22-6/23	7/23-6/24
B.S.	15	10	7
Masters	8	18	12
PhD	9	2	7

Number of Graduates

Graduate Student Enrollment: 24 Masters/ 71 Ph.D.
ABET Accreditation: Nuclear Engineering

Nuclear Science and Engineering Faculty

Paul P. H. Wilson, Professor and Department Head (608-263-0807) [paul.wilson@wisc.edu] Ph.D.**,** University of Wisconsin, Madison**,** 1999. Nuclear fuel cycles; transmutation/depletion/activation; proliferation analysis; energy policy; Monte Carlo methods; reactor core design & analysis.
Website: https://directory.engr.wisc.edu/neep/Faculty/Wilson_Paul/

Adrien Couet, Professor (608-265-7955) [couet@wisc.edu] Ph.D., Penn State University,2014.
Nuclear materials; Irradiation damage; Corrosion of metals and alloys; Oxidation model; Electrochemistry; Synchrotron radiation; Defect transport in oxides.
Website: https://directory.engr.wisc.edu/neep/Faculty/Couet_Adrien/

Stephanie Diem, Assistant Professor (608-263-1414)[sjdiem@wisc.edu] Ph.D., Princeton University. Experimental plasma physics; Magnetically confined plasmas; Microwave heating and current drive; Electron Bernstein wave emission, heating and current drive; Understanding and controlling edge instabilities in plasmas. Website: https://directory.engr.wisc.edu/neep/Faculty/Diem_Stephanie/

Juliana Pacheco Duarte, Assistant Professor (608-265-7955) [pachecoduarte@wisc.edu] Ph.D., University of Wisconsin-Madison, 2018. Safety analysis; Thermal-hydraulics; Post-critical heat flux; Two-phase flow.
Website: https://directory.engr.wisc.edu/neep/Faculty/Duarte_Juliana/

Benedikt Geiger, Assistant Professor (608-262-3386)[benedict.geiger@wisc.edu] Ph.D., Ludwig- Maximilians University, 2013. The experimental investigation of turbulent particle and heat transport in present day devices with the aim to develop new turbulence-optimized stellarator experiments.
Website: https://directory.engr.wisc.edu/neep/Faculty/Geiger_Benedikt/

Chris C. Hegna, Professor (608-263-0810) [cchegna@wisc.edu] Ph.D., Columbia, 1989. Theoreticalplasma physics; fusion science; magnetic confinement of plasmas; magnetohydrodynamics.
Website: https://directory.engr.wisc.edu/neep/Faculty/Hegna_Chris/

Charles Hirst, Assistant Professor (608-263-2760) [cahirst@wisc.edu] Ph.D., Massachusetts Institute of Technology, 2022. Nuclear materials; Radiation damage; In situ experiments; Coupled extremes; Irradiation creep mechanisms; Gradient experiments; Thermal analysis; Defect recovery stages; Differential scanning calorimetry; Stored Energy. Website: https://directory.engr.wisc.edu/neep/Faculty/Hirst_Charles/

Benjamin Lindley, Assistant Professor (608-263-1946) (lindley2@wisc.edu) Ph.D., University of Cambridge, 2014. Design and analysis of advanced nuclear reactors, with emphasis on core design; Reactor physics and Multiphysics methods development; Flexible operation of nuclear reactors: Integrated Energy Systems, cogeneration, load-following, advanced power conversion cycles; Market and economic context for advanced nuclear power; Fuel cycle analysis; Uncertainty quantification, reduced order modelling and data assimilation. Professional Engineer.
Website: https://directory.engr.wisc.edu/neep/Faculty/Lindley_Benjamin/

Oliver Schmitz, Professor (608-265-3633) (oschmitz@wisc.edu) Ph.D., Physics, Heinrich-Heine-Universität, Dusseldorf, 2006. Plasma Edge Physics, Plasma Wall Interaction, Three-Dimensional Plasma Edge Transport and Wall Interaction, Helicon Plasma Generation and Sustainment, Active Plasma and Neutral Spectroscopy, Plasma Sources and Diagnostics, Atomic Modeling for Plasma Diagnostics, Laser-Based Plasma Spectroscopy, Next Generation Plasma Wakefield Accelerators.
Website: https://directory.engr.wisc.edu/neep/Faculty/Schmitz_Oliver/

Kumar Sridharan, Professor (608-263-4789) [kumar.sridharan@wisc.edu] Ph.D., University of Wisconsin-Madison, 1989. Nuclear reactor materials research and development; Irradiation effects in materials; Corrosion of materials; High temperature materials; Physical metallurgy and mechanical behavior of materials; Ion implantation and plasma-assisted thin film deposition of materials; Surface modifications and coatings including nanoscale processes and materials; Emerging and commercial surface engineering technologies; Wear and nanotribology of materials; Processing-structure-properties-performance relationships in materials; Conventional and advanced materials characterization and analysis techniques; Materials applications, challenges, and solutions for a broad spectrum of industrial applications; Failure analysis.
Website: https://directory.engr.wisc.edu/neep/Faculty/Sridharan_Kumar/

Yongfeng Zhang, Assistant Professor (608-890-3779)[yzhang2446@wisc.edu] Ph.D., Rensselaer Polytechnical Institute, 2009. Multiscale modeling and simulation of materials aging and degradation in extreme conditions: Irradiation effect, Mechanical degradation, Corrosion and stress corrosion cracking.
Website: https://directory.engr.wisc.edu/neep/Faculty/Zhang_Yongfeng/

Other Faculty

Mark Anderson, Consolidated Papers Professor (608-263-2802) [manderson@engr.wisc.edu] Ph.D., University of Wisconsin, Madison, 1998. Fundamental physics and applications relating to advanced energy utilization; energy extraction and energy production with focus on experimental thermal hydraulics for advanced nuclear; solar and waste heat recovery energy sources. Also, Mechanical Engineering, Wisconsin Energy Institute. Website: https://directory.engr.wisc.edu/me/Faculty/Anderson_Mark/

Bryan Bednarz, Assistant Professor (608-262-5225) [bbednarz2@wisc.edu] Ph.D., Rensselaer Polytechnic Institute, 2008. Monte Carlo method; Proton therapy; Radiation protection.
Website: https:// directory.engr.wisc.edu/neep/Faculty/Bednarz_Bryan/

James P. Blanchard, Professor Emeritus (608-265-2001) [blanchard@engr.wisc.edu] Ph.D.**,** University of California, Los Angeles**,** 1988. Nuclear micro batteries; radiation damage; fusion technology; laser-induced stresses; surface property characterization; reactor vessel embrittlement.
Website: https://directory.engr.wisc.edu/neep/Faculty/Blanchard_James/

Riccardo Bonazza, Professor (608-265-2337**)** [bonazza@engr.wisc.edu) Ph.D.**,** California Institute of Technology**,** 1992**.** Experimental fluid mechanics and heat transfer; impulsive unsteady phenomena; shock tube applications; laser and X-ray imaging & measuring techniques**.**

Curt A. Bronkhorst, Professor (608-890-2586) [cbronkhorst@wais.edu] Ph.D., Massachusetts Institute of Technology. Theoretical/computational mechanics of materials; computational plasticity; multi-scale material modeling; damage mechanics; single crystal plasticity; dynamic material behavior; structural phase transformation

Jennifer Choy, Assistant Professor (608-263-6974) [Jennifer.choy@wisc.edu] Ph.D., Harvard University, 2013. Quantum engineering; atomic and optical physics; nanophotonics; development and characterization of solid-state defects; quantum sensing using atoms and defects in solids; inertial navigation and timekeeping.
Website: https://directory.engr.wisc.edu/ece/Faculty/Choy_Jennifer/

Michael L Corradini, Professor Emeritus (608-263-1648) [corradini@engr.wisc.edu] Ph.D.**,** Massachusetts Institute of Technology**,** 1978**.** Multi-phase fluid mechanics and heat transfer; fission and fusion reactors; nuclear reactor safety; severe accident phenomena; power plant operation and design; energy policy; nuclear fuel cycle. Professional Engineer.
Website: https://directory.engr.wisc.edu/neep/Faculty/Corradini_Michael/

Wendy C. Crone, Professor Emeritus (608-262-8384) [crone@engr.wisc.edu] Ph.D., University of Minnesota**,** 1998. Experimental mechanics of materials; characterization of materials such as shape memory alloys, hydrogels, and biomaterials; therapeutic medical devices.
Website: https://directory.engr.wisc.edu/neep/Faculty/Crone_Wendy/

Ray J. Fonck, Professor Emeritus (608-263-7799) [fonck@engr.wisc.edu] Ph.D.**,** Princeton, 1978. Plasma & fusion science and technology; plasma turbulence; burning plasmas; tokamaks; alternative fusion schemes; atomic physics and applied optics; high temperature plasma diagnostics.
Website: https://directory.engr.wisc.edu/neep/Faculty/Fonck_Raymond/

Cary Forest, Professor (608-263-0486) [cbforest@wisc.edu] Ph.D., Princeton University, 1992. Experimental plasma physics. Website: https://www.physics.wisc.edu/directory/forest-cary/

Jennifer Franck, Assistant Professor (608-263-2562)[jafranck@wisc.edu] Ph.D., California Institute of Technology, 2009. Computational fluid dynamics; unsteady fluid mechanics; turbulent flows; wind and tidal energy; aerodynamics; flow control; propulsion; fluid-structure interaction.
Website: https://directory.engr.wisc.edu/ep/Faculty/Franck_Jennifer/

Douglass L. Henderson, Professor Emeritus (608-263-0808) [henderson@engr.wisc.edu] Ph.D., University of Wisconsin, Madison, 1987. Reactor physics; radiation transport; fusion reactor technology; nuclear waste.
Website: https://directory.engr.wisc.edu/neep/Faculty/Henderson_Douglass/

Gerald L. Kulcinski, Professor Emeritus (608-263-1601) [kulcinski@engr.wisc.edu] Ph.D., University of Wisconsin, Madison, 1965. Magnetic/inertial fusion reactor systems studies; radiation damage and nuclear materials; lunar mining of helium-3.
Website: https://directory.engr.wisc.edu/neep/Faculty/Kulcinski_Gerald/

Dane D Morgan, Professor (608-265-5879) [ddmorgan@wisc.edu] Ph.D., University of California-Berkeley, 1998. Computational materials science for materials design; Ab initio electronic structure and multiscale methods for large time/length scales and thermokinetics; Ab initio-based modeling of electrochemical systems and processes; Machine learning techniques for accelerating materials analysis and discovery; Application areas: nuclear materials, battery and fuel cell electrodes, electronic materials. Also, Materials Science and Engineering. Website: https://directory.engr.wisc.edu/mse/Faculty/Morgan_Dane/

Gregory A. Moses, Professor Emeritus (608-265-6567) [moses@engr.wisc.edu] Ph.D., University of Michigan**,** 1976. Fusion reactor design; technology enhanced learning; radiation hydrodynamics; computational engineering; nuclear reactor physics. Website: http://www.engr.wisc.edu/ep/faculty/

Gregory Nellis, Professor (608-265-6626) [gfnellis@engr.wisc.edu] Ph.D., Massachusetts Institute of Technology, 1997. Solar energy. Website: https://directory.engr.wisc.edu/me/Faculty/Nellis_Gregory/

Jacob Notbohm, Associate Professor (608-890-0030) [jknotbohm@wisc.edu] Ph.D., California Institute of Technology, 2013. Solid mechanics; Biomechanics; Cell mechanics; Biomaterials; Collective cell migration; Optical microscopy; Adhesion. Website: https://directory.engr.wisc.edu/me/Faculty/Notbohm_Jacob/

John M Pfotenhauer, Professor (608-263-4082) [pfot@engr.wisc.edu] Ph.D., University of Oregon**,**1984. Cryogenics; low temperature refrigeration; applied superconductivity. Also, Mechanical Engineering. Website: http://www.engr.wisc.edu/ep/faculty/

Pavana Prabhakar, Assistant Professor (608-265-7834) [pavana.prabhakar@wisc.edu] Ph.D., University of Michigan, 2013. Damage and failure mechanics of structural composite materials; life prediction of materials in extreme multi-physics environment; Advanced manufacturing of materials - additive manufacturing of hybrid materials; Multiscale material modeling of hierarchical materials; Process modeling - additive manufacturing and composite fabrication.
Website: https://directory.engr.wisc.edu/cee/Faculty/Prabhakar_Pavana/

Carl R. Sovinec, Professor Emeritus (608-263-5525) [csovinec@wisc.edu] Ph.D., University of Wisconsin, Madison, 1996. Computational plasma physics; computational fluid dynamics; magnetohydrodynamics; numerical methods for partial differential equations.
Website: https://directory.engr.wisc.edu/neep/Faculty/Sovinec_Carl/

Izabela Szlufarska, Professor (608-262-1821) [szlufarska@wisc.edu] Ph.D., University of Tennessee, 2004. Computational materials science; mechanical behavior at the nanoscale; Defect behavior in semiconductors and insulators under irradiation; Solid/liquid interfaces; Nucleation and kinetics of medium range order in bulk metallic glasses. Website: Website: https://directory.engr.wisc.edu/mse/Faculty/Szlufarska_Izabela/

Ramathasan Thevamaran, Associate Professor (608-262-5724) [thevamaran@wisc.edu] Ph.D., California Institute of Technology, 2015. Mechanical behavior of structure materials; Dynamic properties; Hierarchical materials; Nanomaterials; Metamaterials; Wave propagation; Experimental techniques.
Website: https://directory.engr.wisc.edu/me/Faculty/Thevamaran_Ramathasan/

Dan Thoma, Professor (608-262-3751) [dthoma@wisc.edu] Ph.D., University of Wisconsin - Madison, 1992. Autonomous materials research; Metal additive manufacturing; Alloy design and development; Advanced materials for energy applications; Phase transformations for functional materials, Thermal analysis and dilatometry. Website: https://directory.engr.wisc.edu/mse/Faculty/Thoma_Dan/

RESEARCH TRAINING AND FISSION REACTORS IN NORTH AMERICA

COLORADO SCHOOL OF MINES with USGS
TRIGA 1000 kW in Partnership with the U.S. Geological Survey
Tim DeBey, USGS (303) 236-4726, tdebey@usgs.gov
Denver Federal Center, Denver, CO 80225-0046

ECOLE POLYTECHNIQUE DE MONTREAL
SLOWPOKE 20 kW - Cornelia Chilian, Director of SLOWPOKE laboratory
(514) 340-4711, ext. 4754
cornelia.chilian@polymtl.ca

IDAHO STATE UNIVERSITY
AGN-201P-103, 0.005 kW – Mary Lou Dunzik-Gougar
Engineering Laboratory, Pocatello, ID 83209-8060
(208) 282-3351/FAX: (208) 282-4538; mldg@isu.edu

KANSAS STATE UNIVERSITY
TRIGA-MkII, 1250 kW – Dr. Alan Cebula, Reactor
Facility Manager
Department of Mechanical and Nuclear Engineering
Ward Hall, Manhattan, KS 66506
(785) 532-6657
alanc@ksu.edu

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
MITR, 6MW - Directors, Dr. Gordon Kohse, Prof. Jacopo Buongiorno, Dr. Lance Snead
Nuclear Reactor Laboratory, 138 Albany Street, Cambridge, MA 02139
(617) 253-4211; kohse@mit.edu

MISSOURI UNIVERSITY OF SCIENCE & TECHNOLOGY
UMRR 200 kW – Dr. Joseph Graham, Director
231 Fulton Hall or 132 Straumanis-James Hall
Missouri University of Science and Technology
Rolla, MO 65409
(573) 341-7759

NORTH CAROLINA STATE UNIVERSITY
PULSTAR 1000 kW – Dr. Ayman I. Hawari, Director
Department of Nuclear Engineering, Campus Box 7909, Raleigh, NC 27695
(919) 515-4598/FAX: (919) 513-1276; ayman.hawari@ncsu.edu

OHIO STATE UNIVERSITY
OSURR, 500 kW – Dr. Lei Raymond Cao, Director
Director, The Ohio State University Nuclear Reactor Laboratory
Professor, Mechanical & Aerospace Engineering
1298 Kinnear Rd, Columbus, OH 43212-1154
reactor@osu.edu

OREGON STATE UNIVERSITY
TRIGA MkF 1100 kW – Dr. Stephen Reese, Director
A100 Radiation Center, Corvallis, OR 97331-5903
(541) 737-2341/FAX: (541) 737-0480
binneys@rc.orst.edu

THE PENNSYLVANIA STATE UNIVERSITY
TRIGA, 1000 kW **–** Prof. Kenan Unlu
Breazeale Nuclear Reactor, Radiation Science and Engineering Center
University Park, PA 16802-2301;
(814) 865-6351/FAX: (814) 863-4840; k-unlu@psu.edu

PURDUE UNIVERSITY
Nuclear Reactor, 10 KW
Seungjin Kim, Facility Director, seungjin@purdue.edu
Stylianos Chatzidakis, Associate Reactor Director, Director of Nuclear
Engineering Radiation Laboratory, schatzid@purdue.edu
363 N Grant Street West Lafayette, IN 47907

REED COLLEGE
Triga-MkI, 250 kW – Jerry Newhouse, Director
Reed Reactor Facility, Portland, OR 97202-8199
(503) 777-7222/FAX: (503) 777-7274
reactor@reed.edu

RENSSELAER POLYTECHNIC INSTITUTE
Walthousen Reactor Critical Facility, 0.1 kW – Professor Peter Caracappa, Director
110 Eighth Street, Troy, NY 12180-3590
(518) 276-6000

RHODE ISLAND NUCLEAR SCIENCE CENTER
RINSC, 2000 kW – Dr. Cameron Goodwin, Director
16 Reactor Road Narragansett RI 02882
(401) 874-2600/ Fax: (401) 874-9452
cgoodwin@rinsc.ri.gov

ROYAL MILITARY COLLEGE OF CANADA
SLOWPOKE-2 Facility
Kathy S. Nielsen, Director
613-541-6000, ext. 6385; nielsen-k@rmc.ca

TEXAS A&M UNIVERSITY
AGN-201, 0.005 kW
One-megawatt TRIGA (Testing, Research, Isotopes, General Atomics) reactor
Mr. Jere Jenkins, Reactor Supervisor
Nuclear Engineering & Science Center, 1095 Nuclear Science Road, College Station, TX 77843
jere@tamu.edu

UNIVERSITY OF CALIFORNIA, DAVIS
(UCD/MNRC) TRIGA 2000 kW - Dr. Wesley Frey, Director
McClellan Nuclear Radiation Center
5335 Price Avenue, Bldg. 258, McClellan, Ca 95652

UNIVERSITY OF CALIFORNIA, IRVINE
TRIGA-MkI, 250 kW - Dr. George E. Miller, Reactor Supervisor and Facility
Director Department of Chemistry, Irvine, CA 92697
Contact Info: John Keffer
jkeffer@uci.edu
(949) 824-6082

UNIVERSITY OF FLORIDA
UFTR 100 kW
Don Wall, Director
202 NSC, P.O. Box 118300
Gainesville, FL 32611-8300
(352) 392-1408 ext. 317/FAX: (352) 392-3380; donald.wall@ufl.edu

UNIVERSITY OF MARYLAND
TRIGA 250 kW – Amber Johnson, Director, UMD Radiation Facilities
Nuclear Engineering Program,
Department of Materials & Nuclear Engineering, College Park, MD 20742
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UNIVERSITY OF MASSACHUSETTS, LOWELL
1 MW Pool type reactor – Dr. Sukesh Aghara, Director
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UNIVERSITY OF MISSOURI, COLUMBIA
MURR, 10,000 kW – Matt Sanford, Executive Director Research
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UNIVERSITY OF NEW MEXICO
AGN-201M-112, 0.005 kW – Dr. Robert Busch, Reactor Supervisor
Chemical and Nuclear Engineering Department, FEC209, Albuquerque, NM 87131-1341
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UNIVERSITY OF TEXAS AT AUSTIN
TRIGA-MkII, 1100 kW – Dr. William Charlton, Director and Professor
Nuclear Engineering Teaching Lab, J.J. Pickle Research Campus #159, Austin, TX 78712
(512) 471-5373/FAX: (512) 471-4589
http://www.me.utexas.edu/~net1

UNIVERSITY OF UTAH
TRIGA-MkI, 100 kW - Andrew Allison, Reactor Supervisor
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UNIVERSITY OF WISCONSIN, MADISON
TRIGA MkF 1000 kW – Mr. Robert J. Agasie, Director
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WASHINGTON STATE UNIVERSITY
Modified TRIGA, 1000 kW – Corey Hines, Director
Nuclear Science Center & NUCS Core Facility
Nuclear Radiation Center, Pullman, WA 99164-1300
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