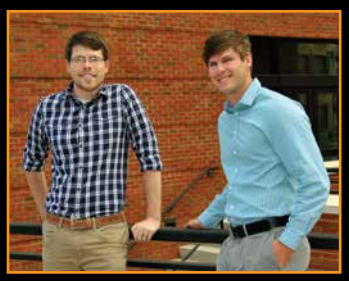
FALL 2014

UTNEUPDATE

A Publication from the Department of Nuclear Engineering at the University of Tennessee

UCOR
Continues Nuclear Engineering Support



Sam Donnald and Nathan Capps
Outstanding NE PhD Students

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UT Nuclear Engineering Achieves Major Advances in Enrollment, Research, and Recognition

THE UNIVERSITY of TENNESSEE
KNOXVILLE
Department of Nuclear Engineering
COLLEGE OF ENGINEERING

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Department of Nuclear Engineering • Fall 2014

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THE UNIVERSITY of TENNESSEE KNOXVILLE
Department of Nuclear Engineering
COLLEGE OF ENGINEERING

Department Head's Message from Dr. Wesley Hines

It is with great pleasure that I have the opportunity to share with you the many successes of our nuclear engineering program. This past year, we once again experienced improvements in the quality and quantity of our students, the number and productivity of our faculty, and we moved forward with plans for a new engineering facility to be the home for our department.

This last year we graduated more PhD students (twelve) than ever before in our history and more than reloaded with forty new graduate students beginning their studies this fall. Our BS graduates were above fifty again and we graduated twenty-five MS students. The quality of our students continues to impress. As evidence, our undergraduate students were awarded nine Nuclear Engineering University Program scholarships funded by the Department of Energy. This was almost twice as many as any other nuclear engineering program in the country. Additionally, our graduate students were also awarded three graduate fellowships, which is the maximum allowed for one university.

Our faculty numbers continued to expand, as did their scholarly activities. We hired two additional faculty this past year bringing our total to seventeen. This expansion included an additional Governor's Chair, bringing the total to three, more than any other department on campus. Total externally funded research expenditures were almost $10 million, which is close to ten times more than when I arrived at UT twenty years ago. The majority of the research expenditures go to support our growing graduate and undergraduate student researchers.

One major achievement I would like to share is the completion of the programming for our new building. As you probably know, our current building was built in 1925 as the university's power plant and later renovated into an academic building. We have outgrown the Pasqua Engineering Building and our students, faculty, and laboratories are currently spread across five engineering buildings. The new 230,000 square foot engineering building will bring all of those functions back into a common building where we can have closer collaborations. The proposed building will house our Department of Nuclear Engineering, the College of Engineering (COE) Freshman engage™ Program, and approximately 40,000 square feet of COE general engineering laboratories. The nuclear engineering portion of the building will provide us with expanded student, faculty, and staff offices; new academic classrooms; meeting rooms, conference rooms, collaboration areas, lounges, break areas, student study areas; and will host twenty-three state of the art laboratories which will provide our researchers with unique capabilities.

With improvements in all of our performance metrics, we also received feedback from our peers in the way of an improved national ranking to number five in *U.S. News and World Report*. These improvements are directly attributed to the hard work of our students, faculty, staff, and administration. We also reengaged with many of our alumni and benefited from their investments in our department through endowments and gifts.

The leading indicators for this coming year are as strong as ever and we are all looking forward to the challenges and opportunities on the horizon.

Sincerely,

Wesley Hines
Charles P. Postelle Distinguished Professor in Nuclear Engineering and Head
Department of Nuclear Engineering

Faculty News

New Faculty: Dr. David Donovan


Dr. David C. Donovan

Dr. David C. Donovan has joined the Department of Nuclear Engineering as an assistant professor. Donovan received his BS in nuclear engineering from the University of Illinois at Urbana-Champaign and his MS and PhD degrees in nuclear engineering and engineering physics from the University of Wisconsin-Madison. Prior to coming to UT, Donovan was a postdoctoral appointee at Sandia National Laboratory in Livermore, California, in the Hydrogen and Metallurgy Sciences Department where he did collaborative work with the DIII-D Experimental Fusion Reactor at General Atomics in San Diego, California. He was also involved in collaborative research projects with the Idaho National Laboratory on the Tritium Plasma Experiment. Donovan was an executive member of the University of Wisconsin Energy Hub from 2008-2011 and conference director for that same organization in 2008.

NE Department Head Begins Year as NEDHO Chair


Dr. J. Wesley Hines

Dr. J. Wesley Hines, the Charles P. Postelle Distinguished Professor in Nuclear Engineering and head of the UT Department of Nuclear Engineering, was named the vice chair/chair elect for the Nuclear Engineering Department Head Organization (NEDHO) in 2013. NEDHO is an alliance of heads (chairs) of nuclear engineering departments and programs in North America. NEDHO was formed to provide a forum for discussion, coordination, and collaboration on issues facing academic programs emphasizing nuclear and radiological science, engineering, and technology. Hines began duties as the chair of the organization in the summer of 2014.

Hines also recently was named the recipient of the Glenn Murphy Award for 2014 from the American Society for Engineering Education.

The award, named for one of the pioneering leaders in nuclear engineering at the collegiate level over a four-decade career at Iowa State, is one of the society's top honors.

The award, consisting of an honorarium and a certificate, is given annually to an ASEE faculty member serving in a full-time role in either the US or Canada.

Selected by friends, colleagues, and former students of Murphy, the honoree must exhibit excellence in teaching, both in laboratories and classrooms; make significant contributions to literature in the field; use real-life issues or problems to get students involved; and put forward breakthrough ideas, analysis, or contributions to nuclear engineering.

Hines also has been honored as a distinguished alumnus of The Ohio State University and has received best paper awards at two international conferences this year.

Zinkle is New Governor's Chair for Nuclear Materials


Dr. Steve Zinkle

Dr. Steve Zinkle, an authority on the effect of radiation on materials in fission and fusion nuclear reactors, is the thirteenth UT-ORNL Governor's chair and is the tenth Governor's Chair in the engineering college.

Zinkle serves as the Governor's Chair for Nuclear Materials and is based in the Department of Nuclear Engineering and the Department of Materials Science and Engineering.

Zinkle was previously a UT-Battelle Corporate Fellow at ORNL and was chief scientist for the laboratory's Nuclear Science and Engineering Directorate. In 2012, he was elected to the prestigious National Academy of Engineering, one of the field's top professional honors. He joined ORNL in 1985 as a Eugene Wigner Fellow, led the laboratory's nuclear materials and science technology group from 2001 to 2006 and directed the Materials Science and Technology Division from 2006 to 2010.

Zinkle's research provides an important component toward understanding how structural materials inside fusion and fission reactors handle radiation. His research goal is to develop high-performance, radiation-resistant materials for advanced nuclear fission and fusion energy applications.

Zinkle received a bachelor's degree in nuclear engineering, master's degrees in materials science and engineering, and a doctorate in nuclear engineering from the University of Wisconsin, Madison.

The UT–ORNL Governor's Chair Program is funded by the state of Tennessee and ORNL. It is designed to attract exceptionally accomplished researchers from around the world to boost joint research efforts that position the partnership as a leader in the fields of biological science, computational science, advanced materials, and neutron science.

Zinkle was also recently elected a Fellow of the American Physical Society (APS). He was recognized for his significant contributions to the fundamental understanding of radiation effects in metallic and ceramic materials.

NE Assistant Professor Receives Powe Award


Dr. Eric Lukosi

Dr. Eric Lukosi, an assistant professor in nuclear engineering, received a prestigious Ralph E. Powe Junior Faculty Enhancement Award from Oak Ridge Associated University (ORAU) and matching funds from the UT Office of Research. The award is given to thirty young faculty members at ORAU member institutions with the goal of enriching their research and professional growth and spurring new funding opportunities. ORAU provides innovative scientific and technical solutions for the US Department of Energy (DOE) and other federal agencies to advance national priorities in science, health, education, and national security. A nonprofit corporation and federal contractor, ORAU manages the Oak Ridge Institute for Science and Education for the DOE.

NE Assistant Professor Receives Subcontract from Pacific Northwest National Laboratory


Dr. Jamie Coble

Dr. Jamie Coble, an assistant professor in nuclear engineering, received a subcontract from Pacific Northwest National Laboratory to continue her work to develop an enhanced risk monitor (ERM) for advanced small modular reactors (AdvSMRs). Current risk monitors use population-based probability of failure data to estimate the risk associated with plant operation and maintenance activities. The ERM significantly improves this approach by incorporating the condition of key components in the plant and their associated probabilities of failure. The research was renewed for a second year to provide student support to further develop and test the ERM.

NE Governor's Chair Wirth Receives Awards, Presents Lectures


Dr. Brian Wirth

Governor's Chair for Computational Nuclear Engineering **Brian Wirth** has received two significant recognitions. Wirth and his SciDAC-Plasma Surface Interactions project team received a high performance computing allocation of 96 Million CPU hours through the Department of Energy (DOE) Office of Advanced Scientific Computing Research (ASCR), ASCR Leadership Computing Challenge (ALCC). For more information, visit: *science.energy.gov/ascr/facilities/alcc/alcc-past-awards/*

Wirth also received an American Nuclear Society (ANS) Materials Science and Technology Division 2013 Literary Award for the peer-reviewed journal article:

N. Juslin and B.D. Wirth, "Interatomic Potentials for Simulation of He Bubble Formation in W," *Journal of Nuclear Materials* 432 (2013), pages 61-66.

Wirth gave a plenary review lecture (one of four such reviews scheduled) at the 21st International Conference on Plasma Surface Interactions 2014 in Kanazawa, Japan, May 29, 2014.

NE Professor Ruggles Visits PEPT Labs in Africa

Dr. Art Ruggles (left) touring the world-class accelerator facility in Cape Town, South Africa, with Indresan Govender (right).

Positron Emission Tomography scanners are being used to track particles in flows in engineering systems in three laboratories worldwide, in Birmingham, United Kingdom; Cape Town, South Africa; and in Bergen, Norway. NE Professor **Arthur Ruggles** is currently funded by the National Nuclear Security Administration (NNSA) to develop the first lab with Positron Emission Particle Tracking (PEPT) capability for engineering flow studies in North America. The NNSA funding is through the Radiochemistry Center of Excellence headed by Governor's Chair Howard Hall. Ruggles visited the PEPT laboratory in Cape Town in May 2014 and discussed tracking techniques and protocols with Indresan Govender at the I-Themba labs.

The university has acquired a Siemen's Inveon preclinical PET scanner for engineering flow studies to replace the soon to be retired Concord Microsystems P4 scanner that was being used for preliminary studies at the UT Graduate School of Medicine. Commissioning of this system in the fall of 2014 will mark the first functioning engineering PEPT laboratory in the US.

Special Feature:
Dr. Larry Miller Graduates 100th Graduate Student

Dr. Laurence Miller (standing) looks over some instrumentation with former student Matthew Urffer. Urffer earned his PhD in nuclear engineering with Miller's guidance in 2013 and is now employed by Knolls Atomic Power Laboratory.

Dr. Laurence Miller graduateed his one-hundredth student in 2014, reaching a big milestone in his contribution to the Department of Nuclear Engineering.

Miller has chaired twenty PhD and eighty MS graduate committees over the last thirty-eight years. About two-thirds of these students have focused their research on radiological engineering topics with the remaining in various areas of traditional nuclear engineering.

His approach in engaging with students is guided by what works best in each situation.

"Some students, especially part-time students, are capable of working rather independently," said Miller. "In other cases it works better to meet frequently, and sometimes almost daily. Each person has varying degrees of capabilities and interest so I have tried to mentor at a level that is effective for a particular student."

Miller mentored his one-hundredth student via distance education, which he says has a different dynamic than overseeing students on campus.

"Most distance students are working and have a more professional approach to their research than young local students," said Miller. "As a result, notably less guidance is normally required for distance students than local students, but not always."

Miller enjoys seeing his students graduate and establish themselves in nuclear engineering, but he finds more satisfaction in seeing their growth during the mentoring process.

"A few students have been very successful in their careers," he said. "However, it is more rewarding to work closely with students and to see their academic progress, regardless of their professional success after satisfying degree requirements."

Miller joined the nuclear engineering faculty in 1976 and taught reactor theory and nuclear engineering laboratory for around twenty-five years. While transitioning to primarily teaching radiological engineering courses, he organized the radiological engineering program in collaboration with personnel from Oak Ridge National Laboratory (ORNL) and Oak Ridge Associated Universities (ORAU) in 1988 and taught many classes at ORAU during the 1990s.

His research currently focuses on radiation measurements with a continuing interest in nuclear fuel cycles and molten salt reactors.

UCOR Reaffirms Commitment to UT Nuclear Engineering

The College of Engineering's strong connection to the research, development, and governmental activities of the facilities and companies in the Oak Ridge area was on display again, as officials from UCOR (URS/CH2M Oak Ridge LLC) presented Dean Wayne Davis the latest installment of a $250,000, five-year commitment to the college.

"The help from partners like UCOR in our continuous drive to improve our college cannot be overstated," said Davis. "Having top faculty members is vital to any success we have, and they allowed us to strengthen ourselves by hiring Jason Hayward through their fellowship support."

UCOR, the federal contractor with the responsibility for cleaning up several sites in the East Tennessee Technology Park, has a keen interest in developments or breakthroughs concerning nuclear science.

The nuclear science and engineering focus made Hayward, an expert in radiation detection, nuclear nonproliferation, and imaging, a natural selection for the UCOR Faculty Fellow.

"As a cleanup contractor of a nuclear site, UCOR is committed to ensuring continued excellence in nuclear education," said Matt Marston, UCOR chief operating officer. "This fellowship is an important step to fulfilling that commitment."

The fellowship is one of many recent high points for both the Department of Nuclear Engineering and Hayward, who has brought in more than $9 million in research funding since he came to UT in 2008.

UCOR chief operating officer Matt Marston (center) presents a check to (from left) Department of Nuclear Engineering head Wes Hines, College of Engineering Dean Wayne Davis, UCOR Faculty Fellow Jason Hayward, and UT Chancellor Jimmy G. Cheek as part of UCOR's fellowship support.

Instruments of Change: Dr. Jason Hayward Wants to Change the World

Dr. Jason Hayward

Jason Hayward wants to change the world. More specifically, he wants to revolutionize the surgical tools doctors use to treat and remove cancer.

But Hayward isn't a physician or a biologist—he is an associate professor of nuclear engineering at UT. What's his plan? To develop new instruments that will harness the power of neutron imaging technology to produce incredibly high-resolution pictures of problems lurking beneath the skin.

Doctors currently use X-rays or computed tomography (CT) scans to evaluate the human body and its bone structure. X-rays are good for taking pictures of the body because they can sense the density contrast between bone and organ tissue. However, those images can't provide a very clear picture when such large differences in density do not exist.

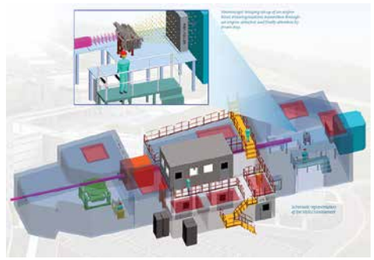
Neutron imaging is similar to X-rays, but with one key difference: it excels at imaging features with little mass. "Compared with X-rays, neutron imaging is an all-around better tool to look at structures that have low mass, perhaps even cellular structures like cancer outgrowth in the body," Hayward says. "The resolution must be high enough to observe what's happening at the cellular level, though."

Today's medical tools limit a doctor's ability to effectively treat cancer because tumor outgrowths are too small to be seen using current tools. Hayward's neutron imaging research looks to improve resolution so observations can be made at the cellular level. This may enable medical professionals to see previously undetectable microscopic cancer cell outgrowths.

"If doctors in the future have the tools and instrumentation to be able to see the cancerous outgrowths, they can be smarter about removing tumors," says Hayward. "They can also be smarter about using radiation treatment to target the tumor. If we're able to improve the technology, we have the potential to see cleaner cancer removal and treatment."

Hayward's research will include work at the Versatile Neutron Imaging Instrument—being built in the coming years to be part of ORNL's Spallation Neutron Source. The instrument, also known as VENUS, will leverage enhanced neutron imaging capabilities to investigate the performance of engineering materials under operating conditions.

Hayward's work is funded by a US Department of Energy Early Career Research Award, which will provide $750,000 over five years. "The five-year time period is great because I can spend the time it will take to advance the basic research," he explains.



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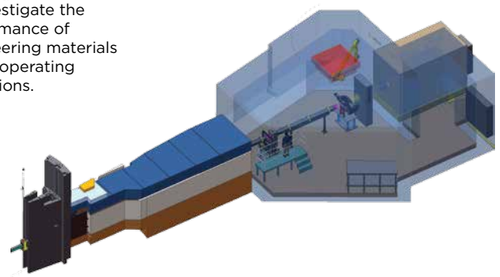


The fruits of Hayward's labor could also have a huge impact on other areas outside the operating room. For example, neutron imaging may help overcome known limitations to creating the next generation of high performance electric automobiles by allowing researchers to observe the way lithium flows through an advanced battery. The development of a high resolution imaging instrument, used along with modeling and simulation tools, is expected to be integral to solving degradation issues and increasing the performance of these batteries.

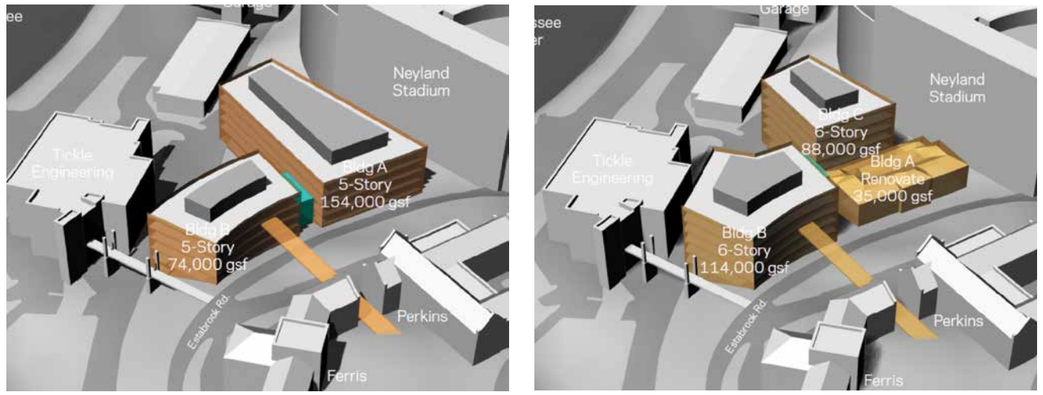
"There's a lot of promise in looking at things with neutrons that you can't see with X-rays. We just need to enhance the instrumentation used for research," Hayward says. "My focus is on the instrumentation side of neutron beams. This particular work was motivated by a collaboration with a scientist at ORNL's Spallation Neutron Source (SNS) who made me aware of the important problems and current limitations of neutron imaging."

Hayward is a member of a worldwide team of scientists trying to upgrade the imaging tools used in medical research, engineering, and industrial applications. He is teaming with a university in the United Kingdom for his instrument development efforts and his work is an important part of a new high resolution neutron imaging beam line being built at SNS.

If everything goes as planned, Hayward is confident the application of his research will eventually change the world. But be patient. He estimates it will be at least a decade before the technology is mature enough to be readily available for such applications. No doubt, it will be worth the wait.

By Amanda Womac, reprinted by permission from Quest Magazine. Illustrations by Larry Davis, Spallation Neutron Source, ORNL

Progress Continues Toward New Engineering Complex



Two options of proposed plans for the new engineering complex.

A proposed new engineering complex will serve two critical needs for the College of Engineering. It will be the state-of-the-art home for the highly ranked Department of Nuclear Engineering (NE) and the gateway for the college's undergraduate program with a focus on the role of design in student learning and professional preparation. This planned two hundred thousand square foot building with its many laboratory and design facilities will cost about $100 million to construct. The university is expected to provide $25 million of the funds, and the college has helped with this goal through the generous commitments of $10 million in alumni support. The college continues to work with the university on this initiative, particularly as the UT administration recognizes the importance of this project to the university's goals, while both entities understand that the State of Tennessee is judicious in the speed with which state capital projects can be funded.

Efforts to make this building a reality have begun with programming for the planned occupants of the building, including the NE department, the Jerry E. Stoneking engage[tm] Fundamentals Program, and the Engineering Honors Program as well as student support programs such as Engineering Advising, Engineering Professional Practice, Engineering Diversity Programs, and Outreach/International Programs. A key theme of the building will be student design, which will be represented by the Min H. Kao Engineering Innovation Lab for freshmen and the Senior Design Studio that will serve to inspire the freshmen working in the adjacent lab.

Since the Hill, the primary home of engineering, is already densely packed with buildings, this new complex will occupy a footprint that will potentially replace one or more of the facilities currently standing in that area. The anticipated present footprint of the complex would incorporate Pasqua Hall (the current home of the NE department), Estabrook Hall (the current home of engage[TM]), and Berry Hall. While programming does not decide how the site will be used, it offers possibilities for consideration during the next design stage for the project. Current programming recommendations would remove Pasqua and Berry Halls while allowing for a range of possibilities for Estabrook Hall.

Pasqua Hall was originally constructed in 1925 to provide both electricity and steam for heating the entire campus. In time, it ceased to produce electricity but continued as the university's steam plant until a new steam plant was constructed on Neyland Drive in 1966. Pasqua was converted into the home for nuclear engineering in 1973. The department has greatly outgrown the capacity and capabilities of the building over the last forty years.

"The new engineering complex is a critical component of the NE department and the college's space needs for classroom, office, and research space equivalent to a top-tier nuclear engineering program," said COE Dean Wayne Davis. "Both Estabrook Hall and Berry Hall are old buildings that lack sustainable infrastructures. The new engineering complex will serve as a catalyst to support the nuclear engineering department's future growth and will also help to attract students and their parents to our engineering programs. At this time the college's number one priority is to move the new engineering complex forward."

The Institute for Nuclear Security

In January of 2012, Dr. Howard Hall, the Governor's Chair for Global Nuclear Security, working in conjunction with the Department of Nuclear Engineering (NE), the College of Engineering, and the University of Tennessee, established the UT Institute for Nuclear Security (INS). INS was created to examine and come up with potential solutions for crucial problems in nuclear security, including addressing the nuclear threats of countries like Iran and North Korea, considerations related to new proposed nuclear power reactors in the US and abroad, and concerns posed by terrorists groups such as ISIS with the potential for global nuclear threats.

Charter partners in INS include Oak Ridge National Laboratory (ORNL), Y-12 National Security Complex, and Oak Ridge Associated Universities.

"When I arrived at UT and ORNL, I led a strategic planning effort at the lab–called the Future of Nuclear Security Initiative–that looked at the challenges and opportunities ahead of us, and also canvassed the capabilities of potential regional partners to meet those challenges," Hall said. "It quickly became clear that a lot of synergy was possible, and the four principal partners in INS first came together under the earlier initiative. In our collective discussions, the need to solidify this partnership—in other words, develop a distinctive brand and identity—was recognized and endorsed by all the partners."

The INS is housed within the Howard H. Baker Jr. Center for Public Policy on the UT campus. The organization is designed to utilize the collective expertise and capabilities of its partners to address major issues with the plan to expand INS into an internationally recognized policy and educational resource.

"We envisioned the INS spanning potentially all the academic disciplines on campus, because the tough challenges in nuclear security are inherently multidisciplinary," Hall commented. "The Baker Center was a key player in the policy, law, and diplomacy efforts, and was already a campus wide center, so it was a natural fit."

The various faculty roles in INS vary depending on where each individual professor's interests intersect with the organization. Hall said that some of INS's most visible work is in public programming, but the organization also fosters large team approaches to major proposals in the nuclear security field. INS input has also helped to develop the comprehensive curriculum in the NE department and has shaped part of the Master of Public Policy and Adminstration (MPPA) program in political science.

"This winter, we are starting a peer reviewed international journal of nuclear security, and a professor of English will serve as our managing editor," Hall said. "As you can see, we're quite busy!"

The INS continues to develop and provide expertise that will shape national and international policies for nuclear security with a formulation process that involves research, education, training, and field activities.

INS has also held seminars and conferences with premier experts in the nuclear security field and has sponsored events such as an International Security Roundtable in July of 2013, a discussion by Muslim expert Harrison Atkins on relations between the US and Muslims after 9/11 in April of 2013, and the "Uranium Bowl" in March of 2012, where students from UT and North Carolina State University had a physical security "play-off" to measure reactions to an imaginary terrorists attack.

Dr. Howard Hall

"We are continuing to have our lunchtime roundtables, which usually occur once a month," Hall said. "We have Distinguished Lectures (one or two per semester) that are typically evening events. For example, this semester, we will cosponsor a visit by the Director of Los Alamos National Laboratory, and we will also have Dr. Huban Gowadia, Director of Department of Homeland Security's Domestic Nuclear Detection Office, provide a Distinguished Lecture."

Faculty from a broad array of UT colleges and departments, in addition to nuclear engineering, participate in INS research and activities, including professors from the Department of Physics and Astronomy, the Department of Political Science, the Department of Materials Science and Engineering, the Department of Chemistry, the Department of Chemical Engineering, the Colleges of Law and Business, and colleagues from the Baker Center.

"We established this institute in recognition of the fact that there is a tremendous need in this area," said Hall. "The challenges of controlling nuclear arms, securing nuclear materials, and preventing proliferation and nuclear terrorism require broad expertise. Virtually every academic unit of the university can contribute to our nuclear security program."

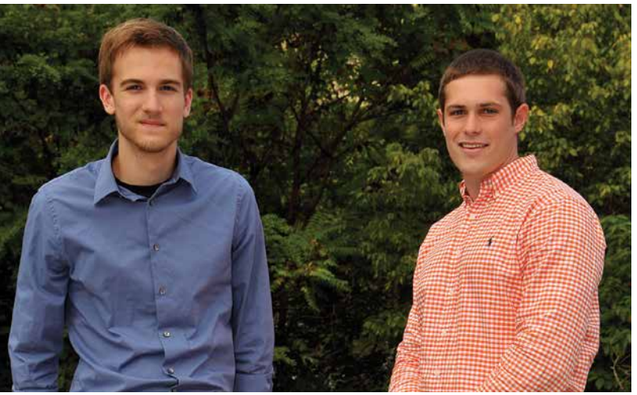
Both undergraduate and graduate students are also engaged with INS across the span of the organization's activities.

INS seeks to form partnerships with government, industry, and academic institutions around the world.

"We want our institute and UT to have a major impact on solving global challenges in nuclear security and our graduates to become the next generation of leaders that secure the future against nuclear threats while preserving our precious liberties," Hall said.

For more information on INS, visit *http://nuclear.utk.edu*.

Outstanding Undergraduate Student Research: Vic Lollar and Zach Welz



Zach Welz (left) and Vic Lollar (right) received the Outstanding Undergraduate Student Research Award.

Vic Lollar and Zach Welz are the first winners of the Department of Nuclear Engineering (NE) Outstanding Undergraduate Research Award, a new award designed to recognize students making strides in research early in their academic careers.

Lollar is a fifth-year senior in nuclear engineering from Maryville, Tennessee, and also a veteran of the UT men's Rugby team. He has made a name for himself within the NE department both for his academic work and in his role as an undergraduate research assistant. He has already completed some graduate-level courses.

Lollar was attracted to nuclear engineering because of the diversity in the field and the opportunity to study in a Top 5 program.

"The professors in this department are phenomenal, knowledgeable, and really care if a student learns or not," he said. "The open-door policy of the department is unique and professors are almost always available and willing to answer any questions. Studying in such a top program has been a wonderful experience, and the research opportunities are diverse and numerous."

Lollar cites Dr. Belle Upadhyaya as being particularly influential to him.

"Dr. Upadhyaya brought me on a large project three years ago as an undergraduate and has provided me with invaluable research experience," said Lollar. "He has shown me the intricacies of the research process and encouraged me to write papers, make posters, and give presentations at national conferences."

Lollar keeps a steady pace with activities like these. He is a recipient of the American Nuclear Society (ANS) Human Factors, Instrumentation & Control Division Scholarship and presented his research at the ANS Winter Meetings in 2012 and 2013. He was awarded an Undergraduate Summer Research Internship in 2012 and received an award for his presentation at the 2013 Exhibition of Undergraduate Research and Creative Achievement (EUReCA). He has been a co-author of several Nuclear Energy University Programs (NEUP) quarterly progress reports and two annual reports.

"I have been involved on the NEUP project 'In-Situ Condition Monitoring of Components in Small Modular Reactors Using Process and Electrical Signature Analysis' for three years," said Lollar. An article he contributed to the project was published in 2013 in the UT research journal *Pursuit*.

"This project has given me valuable experience with the entire research process as I have been involved since the beginning and am currently working to wrap up my portion of the final report," he said.

In addition to being one of the first recipients of the new undergraduate research award, Lollar is prepared for his upcoming graduate studies as the first AMS Nuclear Engineering Graduate Fellow. Analysis and Measurement Services Corporation (AMS) established the fellowship in 2014.

Zach Welz, co-winner of the Outstanding Undergraduate Research Award, is the lead researcher responsible for the heat exchanger degradation laboratory that is part of another NE department NEUP grant. He was cited for his initiative in the operation of this test bed and also for overcoming many unexpected complications and repairs to the system.

"The project taught me advanced MATLAB skills and advanced coding techniques," said Welz. "My current project deals with writing a new and innovative optimization algorithm. It has been a fun experience working to improve the results of industry standard codes using new software techniques."

Welz integrates his personal time into his research approach. Besides getting outdoors for backpacking trips and pickup soccer games, he is currently building his own computer to use for CPU intensive algorithms and gaming.

"It has been a fun experience leaning how a computer really works and figuring out how to optimize performance and graphics," he said.

Welz lived in Colorado and Texas before moving to Tennessee. His enthusiasm for nuclear engineering began in high school in Texas when his freshman chemistry teacher dedicated a week to the basics of nuclear energy. He knew he wanted to learn more at the college level.

"My favorite part of nuclear engineering is how multifaceted it is," said Welz. "While I work in software for system health management, my roommate conducts research on nonproliferation detectors, and another friend studies space radiation."

During his undergraduate career, Welz has received the Col. S.H. Lockett Award, the Teresa M. Maples Scholarship, the NRC Scholarship, and the Tummins Scholarship. He was nominated for the student representative ANS HFIC division executive committee in 2014. He also won the Best Paper Award at the European Conference of the Prognostics and Health Management Society in France for his paper titled "Prognostics for Light Water Reactor Sustainability: Empirical Methods for Heat Exchanger Prognostic Lifetime Predictions." He has an upcoming publication in the *International Journal of Prognostics and Health Management Special Issue* in 2015.

Welz says he has learned important research and organizational skills from Dr. Laurence Miller and NE department head Dr. Wes Hines.

"My first research position was with Dr. Miller," he said. "He hired me when I had no experience and was a new undergraduate. Working for him taught me how to keep a deadline as well as how to communicate with a boss and the importance of good work ethic."

Welz has continued to learn valuable skills working with Hines.

"I have learned how to write proposals and professional papers and how to conduct myself in a work environment," said Welz. "The structure of his research group has taught me how to create quarterly and annual reports and the importance of a chain of command. This position has opened doors for me in ways I could not have hoped for, all while staying in school to earn my PhD."

Outstanding MS Student: Price Collins

Price Collins, a second-year graduate student in the Department of Nuclear Engineering (NE), received the Master's Graduate Research Excellence Award at the department's annual awards banquet on April 24, 2014. The award recognizes students working on their MS degrees who have excelled through their research contributions, publications, patents, presentations at scientific conferences, thesis writing, or other scholarly work.

The student from Wilson, North Carolina, chose the field of nuclear engineering after looking into the environmental effects attributed to burning fossil fuels. He plans to complete his master's degree in fall 2014. While exploring his interest, he has earned notice for his excellent academic performance, as a graduate research assistant, and for inspiring others with his enthusiasm for the NE department.

"My favorite thing about UTNE is all the growth we've experienced since I started in 2008," said Collins, an avid ambassador for the department. "We've hired a bunch of great faculty members, increased our rankings in the graduate curriculum, and are in the process of getting a new building."

Collins maintains his involvement in NE in several ways, including helping Dr. Lawrence Heilbronn to develop a curriculum to teach local Boy Scouts the Nuclear Science Merit Badge and outreach activities with local science, technology, engineering, and math (STEM) students.

"I'm an Eagle Scout myself, so it's always really great to give back to the organization that did a lot for me," said Collins. "I've also been able to teach kids about science at the L&N STEM Academy, thanks to Julie Ezold (a researcher at Oak Ridge National Laboratory who is active in STEM promotion)."

Collins' research is related to instrumentation and controls for small modular reactors, but his interest in nuclear engineering covers a broad range. He has been a co-author of several Nuclear Energy University Programs (NEUP) quarterly progress reports and an annual report. He presented his research at the ANS Annual Meeting in 2013 and also at the last two ANS National Student Conferences. He is working on a journal article to report on the results of his research in dynamics and simulation of integral pressurized water reactors.

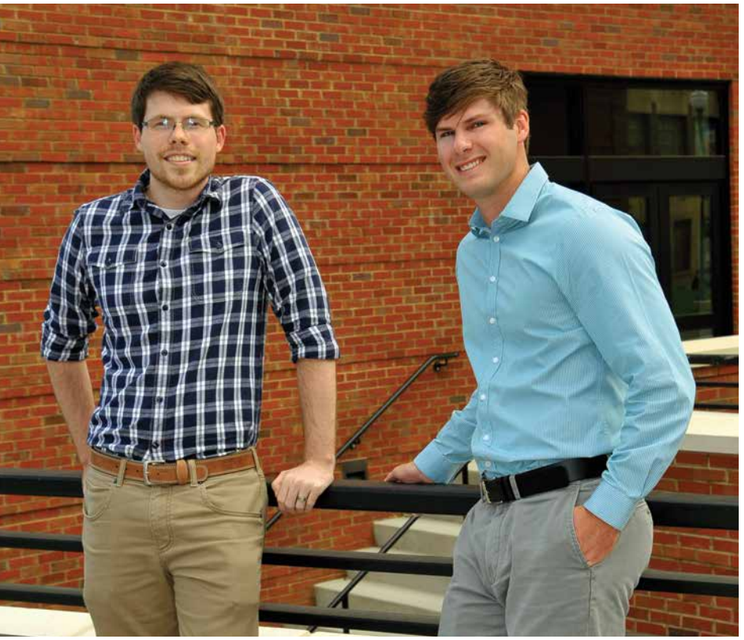
Price Collins is the 2014 Outstanding MS Student in nuclear engineering.

Other awards Collins has earned include the 2013 UT Graduate Travel Award and the 2013 and 2014 Women in Nuclear Travel Awards. He is a member of the UT Chapter of Women in Nuclear (WIN), participates in the ANS Student Section activities, and serves as an ambassador during graduate student recruiting visit.

In addition to Heilbronn, Collins has high regard for the NE faculty, citing Dr. Steven Skutnik, Dr. Lawrence Townsend, and Dr. Laurence Miller in particular.

"I don't think I have enough space to talk about them all!" he said of his professors. "Certainly my advisor, Dr. Belle Upadhyaya, has had a profound influence. He's the one who gave a shot to an undergrad over three years ago and stuck with me since."

Outstanding PhD Students: Sam Donnald and Nathan Capps



Sam Donnald (left) and Nathan Capps (right) are the 2014 Outstanding PhD Students in nuclear engineering.

Nuclear engineering PhD students Sam Donnald and Nathan Capps earned accolades in 2014 by exemplifying the sorts of contributions that students can make to keep their research—and the Department of Nuclear Engineering (NE)—moving forward.

Both received top honors at the department's annual awards banquet on April 24, 2014. Donnald won the 2014 PhD Graduate Research Excellence Award. Capps earned the Masters Graduate Research Excellence Award for accomplishments as an MS student.

The department established the PhD Graduate Research Excellence Award to recognize PhD students who excel in the quality and quantity of their original research and scholarly contributions, publications, patents, conference presentations, and dissertations.

Donnald, from Rosemark, Tennessee, fits the bill with a resume of hard work and involvement. In his time with the department, he has built laboratory capabilities, conducted simulations, grown crystals, conducted a variety of measurements, and analyzed all associated data, mostly independently. He has five peer-reviewed publications in total—two as first author—and he often assists younger student researchers.

As with many students who excel in the field, his enthusiasm for nuclear engineering started early.

"My initial interest was sparked by some of my favorite teachers in high school," Donnald said. "My introductory radiation detection and radiation protection courses solidified my interest."

Donnald earned both his BS and MS degrees in nuclear engineering at UT. He has praise for the entire NE faculty, and cites Dr. Jason Hayward and Dr. Lawrence Heilbronn as being influential for him.

"I have had a lot of great professors in the nuclear department, but two of the most influential to me were Dr. Hayward and Dr. Heilbronn," he said. "Both were excellent professors and taught my first courses in radiation detection and radiation protection."

Hayward, Donnald's advising professor, has particularly inspired the student's drive.

"Dr. Hayward gave me my first opportunity to get involved with research during my undergraduate years and is one of the main reasons that I wanted to get involved with research and work toward a PhD," he said.

In his PhD research, Donnald has worked with UT's Scintillation Materials Research Center (SMRC) to experimentally investigate the light-yield proportionality of a particular scintillator called YAP, which has been observed to only sometimes behave in a proportional manner, depending on crystal growth conditions.

"I've really enjoyed being a part of the SMRC," said Donnald. "It is very rewarding to be involved with the growth and characterization of new radiation detector materials."

Outside of the laboratory, Donnald enjoys tennis and disc golf and playing violin and piano. Off-campus, but very much in line with his studies, he enjoyed making a high-profile presentation in Shanghai at the SCINT 2013 conference.

"One of the best experiences in my graduate career was having the opportunity to present my research on scintillation materials in Shanghai, China," he said.

Nathan Capps completed his MS degree in the fall semester of 2013 with a thesis entitled "Molecular Dynamics Simulations of Cascade Evolution Near Pre-existing Defects." His work earned him the Masters Graduate Research Excellence Award, which was established to recognize top Master's students who have excelled in the quality of their research contributions, publications, and other works, as with the PhD research award. Capps is now working on his PhD research, modeling nuclear fuel performance.

In contrast to Donnald's experience, Capps' interest in nuclear engineering stemmed from finding a lack of information on the subject during his high-school studies in Van Buren, Arkansas.

"Nuclear engineering was something that was not taught at my high school, and for many people nuclear is taboo," said Capps. "This drove me to learn more about the unknown."

Capps investigated topics at the forefront of atomistic modeling for his MS thesis research. His project sought to develop insight and models for the effects of radiation damage as it overlaps with pre-existing defects. Such information is critical to help model and improve the understanding of micro-structural evolution in irradiated materials.

For his PhD project, Capps is helping to develop Peregrine, a three-dimensional nuclear fuel performance code for the Consortium for Advanced Simulation of Light Water Reactors (CASL).

"My favorite project by far has been helping to develop Peregrine," said Capps.

He has written two TopFuel papers for the project, "Verification and Benchmarking of Peregrine Against Halden Fuel Road Data and Falcon" and "Evaluation of Missing Pellet Surface Geometry on Cladding Stress Distribution and Magnitude."

"This project has helped me develop my critical thinking skills as well as understand the physics that cause safety issues in the nuclear industry," he said.

Capps maintains a competitive edge in a variety of pursuits—his men's slow-pitch softball team won the state title in August—and he feels that the faculty in the NE department has helped him stay motivated during his studies and research.

"My favorite thing about NE has to be the professors' passion for teaching," he said. "They make sure that when you leave the university you are a better person and prepared for the challenges ahead of you."

Capps, like Donnald, lists Heilbronn as one of his favorite professors.

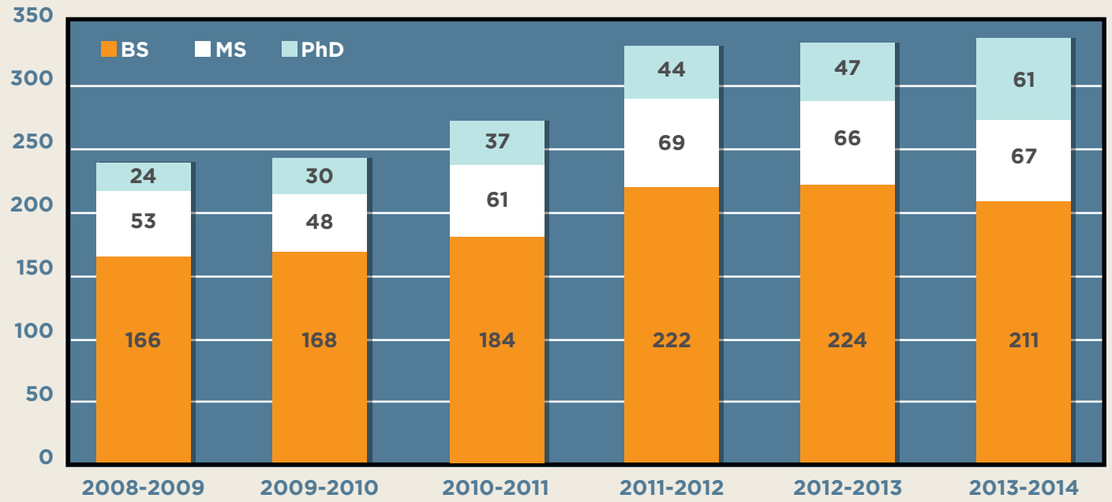
"He explains things clearly and, if you struggle, he will sit there until you figure it out," he said.

Capps also credits Dr. Brian Wirth, his faculty advisor of almost four years, with helping shape his academic career.

"He has helped me mature and grow into the person I am today," said Capps. "His guidance has helped me develop leadership skills as well as critical thinking skills. I look up to him and try to follow in his footsteps."

NE Experiences Record-Breaking Growth, Success

Nuclear Engineering Enrollment



The UT Department of Nuclear Engineering has been experiencing dramatic success during the past few years, including notable upswings in enrollment, degrees granted, faculty numbers, research funding, and national rankings.

In 2014, the NE department tied as the country's number five nuclear engineering graduate school—number four for public universities—in *U.S. News and World Report's America's Best Colleges* rankings. UT's nuclear engineering department is now the second largest department in the US, and ninety-three percent of NE students are US citizens. Comparisons with similar ranked universities places the university's nuclear engineering department in the company of departments at institutions such as MIT, Texas A & M, and Georgia Tech.

U.S. News compared more than one thousand three hundred and fifty graduate programs at public and private institutions for the 2014 rankings. The rankings are based on the opinions of nuclear engineering department heads of those institutions with nuclear engineering programs.

"We're certainly pleased with the continued rise in recognition for and awareness of all that we have to offer here in the College of Engineering," said Dean Wayne Davis. "To see our Department of Nuclear Engineering be recognized as one of the top five in the country—public or private—really is a special moment."

The nuclear engineering department has grown graduate enrollment by sixty-six percent in the last five years and is now the second-largest program in the US in enrollment.

Undergraduate enrollment in the department was up to a total of two hundred and eleven students in academic year (AY) 2013-14, while the department saw a surge in PhD enrollment from twenty-four in AY 2008-09 to sixty-one in AY 2013-14. Total enrollment in the NE department increased by thirty-three percent, with PhD enrollment increasing by more than two hundred and thirty percent.

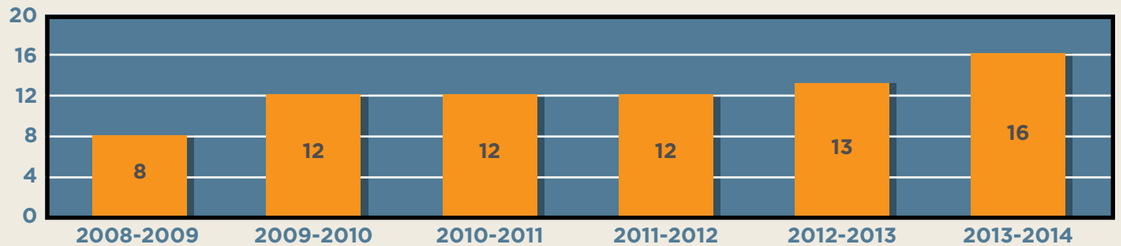
The number of degrees granted by the NE department has also increased dramatically–from thirty-six BS recipients in AY 2008-09 to fifty-one in AY 2013-14; MS degrees increased from a low of eleven in AY 2009-10 to twenty-four in AY 2013-14; and PhD degrees are up from four in AY 2008-09 to a high of twelve in AY 2013-14.

Faculty size has tripled in just six years—a surge due, in part, to the hiring of three Governor's Chairs in the department: Dr. Howard Hall, Governor's Chair for Global Nuclear Security; Dr. Brian Wirth, Governor's Chair for Nuclear Engineering; and Dr. Steven Zinkle, Governor's Chair for Nuclear Materials. The department includes seventeen tenured and tenure-track faculty and seven full time research faculty. In FY 2008-09, NE had only eight faculty members.

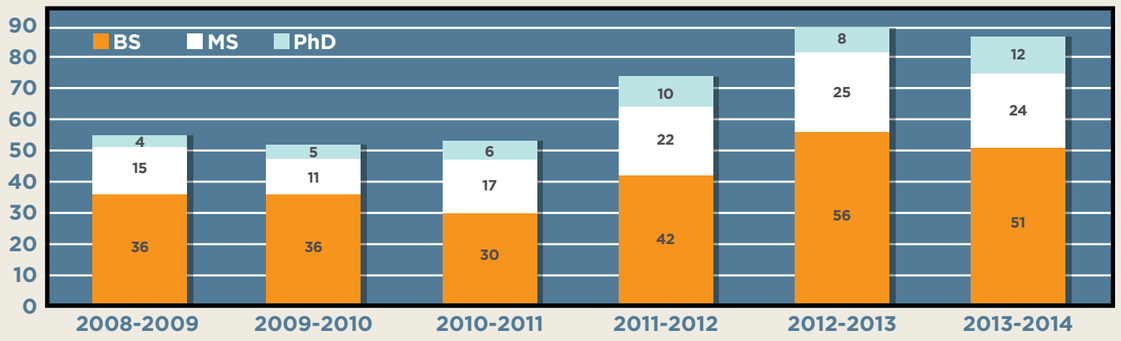
Research expenditures have tripled, from $3 million in FY 2008-09 to $6.9 million in FY 2011-12 to a record high of $9.8 in FY 2013-14.

"We have had an amazing run these past five years," said NE department head Wes Hines. "I look forward to even better times to come."

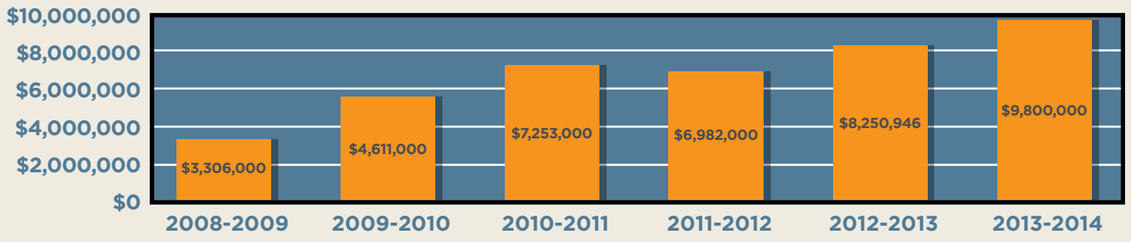
Nuclear Engineering Tenured and Tenure-Track Faculty



Nuclear Engineering Degrees Granted



Nuclear Engineering Research Funding



Student News

Lollar Named First AMS Nuclear Engineering Graduate Fellow

Analysis and Measurement Services Corporation established the AMS Nuclear Engineering Graduate Fellowship in 2014, naming Maryville native Vic Lollar as the first recipient.

"To be selected the inaugural fellowship recipient is a tremendous honor for me," said Lollar. "I've really enjoyed the time I've had here at UT so far, and I'm thankful to have been able to do undergraduate research under Dr. Belle Upadhyaya."

Lollar's research in graduate school will be directed toward nuclear power plant instrumentation and control, as well as monitoring issues.

"I plan to study the same things in graduate school that AMS is known for doing so well," said Lollar. "It will be a great experience to learn from their engineers and to work on cutting-edge research projects."

"AMS has been a valued partner of our department since their inception," said Department of Nuclear Engineering head Wes Hines. "They have supported us in a number of key ways, including research funding, employment of students, and even bringing engineering practice into our classes through lectures from Adjunct Professor Hash Hashemian."

Knoxville-based AMS was co-founded in 1977 by Hashemian, a UT nuclear engineering alumnus, and former nuclear engineering department head Dr. Tom Kerlin to help various aspects of the nuclear power industry, from testing to troubleshooting.

"We're involved in every nuclear power plant in the United States," said Hashemian. "Being able to partner with UT and to give students real-world knowledge and even experience is something that can't be measured."

For Hashemian, the opportunity to help his alma mater came naturally.

"I've been involved with UT and with every department head for nuclear engineering since [Pietro] Pasqua, the first one," said Hashemian. "The energy Dr. Hines has is contagious. He really makes me want to be involved in any way I can."

Vic Lollar stands with his EUReCA-winning poster "In-Situ Condition Monitoring of Components in Small Modular Reactors" in March 2014.

ANS Awards Four Scholarships to Nuclear Engineering Students

The American Nuclear Society (ANS) scholarships are presented to undergraduate students of nuclear science and engineering in recognition of outstanding efforts and academic achievements in pursuit of a college education. Students in the Department of Nuclear Engineering who received these highly sought-after scholarships are:

- Colton Jacob Oldham received the Sophomore Undergraduate Scholarship.
- Mikah Ray Rust received the Junior/Senior Undergraduate Scholarship.
- Travis James Labossiere-Hickman received the Raymond DiSalvo Memorial Scholarship.
- Alyxandria Lorraine Wszolek received the Operations and Power Division Scholarship.

The ANS is a not-for-profit, international, scientific, and educational organization, established to recognize the need to unify the professional activities within the diverse fields of nuclear science and technology. Founded in 1959, the University of Tennessee ANS Student Section is one of the oldest sections in the United States.

The American Nuclear Society (ANS) awarded scholarships to (from left) Alyxandria Wszolek, Mikah Rust, and Travis Labossiere-Hickman. Not pictured, Colton Oldham.

NEUP Awards UT NE Students Record Number of Scholarships and Fellowships

NEUP undergraduate scholarship winners are, standing (from left) Whitney Smith, Alyxandria Wszolek, Gregory Meinweiser, Mikah Rust, and Tucker McClanahan. Seated (from left) are Danielle McFall, Sarah Combee, and Travis Labossiere-Hickman. Not pictured, Kaitlyn Darby.

Nuclear Energy University Programs (NEUP) took notice of students in the Department of Nuclear Engineering (NE) in May 2014, bestowing nine undergraduate scholarships and three graduate fellowships.

Sponsored by the US Department of Energy (DOE) Integrated University Program, undergraduate winners receive a $5,000 scholarship, while the graduate fellowship winners receive $50,000 annually over three years, as well as $5,000 toward summer internships at national laboratories or other approved locations.

The nine undergraduate students awarded scholarships are Sarah Combee, Kaitlyn Darby, Travis Labossiere-Hickman, Tucker McClanahan, Danielle McFall, Gregory Meinweiser, Mikah Rust, Whitney Smith, and Alyxandria Wszolek.

The three graduate students awarded fellowships are Daniel Hamm, Elizabeth Jones, and Ryan Sweet.

"Having our students selected for these honors is a validation of the things we've got going on in our college," said Dean Wayne Davis. "For our students to be recognized like this speaks to their dedication, innovation, and commitment to their work."

The goal of the program is to strengthen ties between students and the DOE's nuclear energy research programs. Students are expected to take on studies of some of the challenges facing the industry today, including sustainability and efficiency.

The nine scholarships break UT's previous high of six, and represent the most awarded to any university, while the three fellowships are tied for the most in this year's awards.

The NEUP graduate students awarded fellowships are (from left) Daniel Hamm and Elizabeth Jones. Ryan Sweet (not pictured) also won a fellowship.

NE Study Abroad

UT nuclear engineering senior Emily Frame, of Oak Ridge, Tennessee, wrapped up a two-semester stint in 2014 working with Czech Technical University (CTU) in Prague, Czech Republic, offering a peek into how the UT-CTU relationship could have added benefits for students.

As part of the experience, Frame participated in a critical experiment involving the university's nuclear reactor—actively working with Czech students in the process—including lowering the fuel rods into the reactor.

"How many students can say that they have gone inside a reactor and disassembled pieces of the core?" said Frame. "That's the most unique part of my experience. Not only have I been able to conduct experiments at the reactor, I've also participated in its maintenance."

Frame also took part in last year's study abroad visit to Prague and Vienna, Austria, which included stops at nuclear facilities and cultural icons in the region.

"I toured the Mochovce Nuclear Power Plant in Slovakia, a research reactor in Budapest, and the IAEA in Vienna," she said. "These visits have given me a broader perspective of the nuclear industry."

She credits the ability of the two universities to work together and the eagerness of the faculty in Prague for making her studies abroad a success.

"The partnership between Czech Technical University and UT provided me the opportunity to further my education in a unique, highly personalized way," said Frame. "That this experience has been so productive, so pleasant, is largely due to the time and effort my professors have taken to work with me one-on-one."

Frame says she did not know what to expect when she "jumped on board" for studies at CTU, but looks back on the experience as a very rewarding one.

"I hope my participation in this program and the opportunity I've had here to interact with Czech students from all levels of study—both inside and outside the classroom—will encourage other UT students to study at the university in Prague," said Frame.

Nuclear engineering senior Emily Frame, at right, helped reconfigure the core in the research reactor at the Czech Technical University in Prague.

Nuclear engineering senior Emily Frame (third from right) worked with Czech students at a research reactor in Budapest.

Nuclear engineering students in the 2014 faculty-led study-abroad class visited cultural sites such as Prague Castle. Photo by Naser Burahmah.

NE Initiates Charter Members into Nuclear Engineering Honor Society

The Nuclear Engineering Department initiated twenty charter members into its new chapter of Alpha Nu Sigma, the nuclear engineering honor society.

Alpha Nu Sigma was formed in 1979 to recognize high scholarship, integrity, and potential achievement in applied nuclear science and nuclear engineering among outstanding students. The University of Tennessee chapter, the Tennessee Alpha Chapter, was initiated this year to recognize our premier students in the nuclear engineering field. The charter members were inducted into the new chapter at the Nuclear Engineering Awards Banquet held on April 24, 2014. Qualified students will be inducted on an annual basis to recognize high scholarship in the field of nuclear engineering.

Dr. Martin Grossbeck, (far left), NE professor and chapter advisor, with charter members (left to right) Blake Palles, John Stooksbury, Daniel Hamm, Jennifer Littell, Cody Wiggins, Kaleb Darrow, and Danny Tran.

2014 Alpha Nu Sigma Charter Members

Franklin Brooks
Sarah Combee
Kaleb Darrow
Jonah Duran
Nicole Galante
Daniel Hamm
Adam Hasse
Jennifer Littell
Victoria Martin
Blake Palles
Jason Rizk
David Shell
Whitney Smith
John Stooksbury
Danny Tran
David Vanlandingham
Eric Welch
Matthew Weeks
Cody Wiggins
Fahad Zaman

Nuclear Engineering Students Visit Prague

For many college students, the week after graduation signals an opportunity to travel. For a lucky few, that might even include a trip abroad. For a group of UT Department of Nuclear Engineering (NE) students, it means both a chance to head to Europe and the opportunity of a lifetime.

Led by assistant professors Dr. Ondrej Chvala and Dr. Eric Lukosi, the nine students visited Prague, Czech Republic, to spend time with their counterparts at Czech Technical University (CTU) and even took a trip to the uranium mine in Roznika.

It's all part of a developing bond between the two universities as they build a closer relationship. Students received credit for a junior level nuclear engineering laboratory course for participating in a reactor physics training course offered at the CTU reactor. They visited several nuclear-related sites in the region.

"This represents a great chance for UT students to share ideas with counterparts from another part of the world, to work through real-world scenarios and to gain experience in a way different from what they might otherwise see," said College of Engineering Dean Wayne Davis. "Being able to actually participate in activities at the nuclear reactor is a great experience for all involved."

CTU was founded in 1707 and is one of the oldest and largest technical institutions in Central Europe. Among its notable alumni are Christian Doppler, pioneering researcher of the Doppler effect; Frantisek Krizik, inventer of the electric arc lamp; and Vladimir Prelog, the 1975 Nobel Prize for Chemistry winner.

The 2014 faculty-led study-abroad nuclear engineering class visited sites such as this yellow cake storage facility at the Rozna Uranium Mine.

With a memorandum of understanding in place, the focus will shift to joint research opportunities, the sharing of educational material and ideas, and the exchange of students, faculty, staff and researchers.

"We're pleased to be able to team up with them, and for our students to get some experience in seeing how another country's nuclear program runs," said NE department head Dr. Wes Hines. "We're building a good relationship with Dr. Lubomir Sklenka's nuclear department, one that can be beneficial to both institutions."

Uhrig Family Establishes Scholarship for NE

Dr. Robert Eugene Uhrig (1928–2013) worked at the University of Tennessee from 1986 through 2002 in the Nuclear Engineering Department. He was a Distinguished Professor and held a joint appointment at Oak Ridge National Lab as a Distinguished Scientist in the Instrumentation and Controls Division under the UT/ORNL Science Alliance Program. Uhrig was also the founding director of the University of Tennessee Center for Neural Engineering and Applications. He was known for his work on the application of artificial intelligence methods, primarily expert systems and neural networks, to nuclear power plant systems.

He received a BS degree (with honors) in mechanical engineering from the University of Illinois in 1948 and MS and PhD degrees in theoretical and applied mechanics from Iowa State University in 1950 and 1954, respectively. In 1976 he graduated from the Advanced Management Program of the Harvard Business School and was a Registered Professional Engineer in Florida and Iowa. He authored over 250 technical and professional publications, more than 100 tutorials and seminars, a book, *Random Noise Techniques in Nuclear Reactor Systems* (1970, published in Russian 1974), and co-author (with Dr. Lefteri H. Tsoukalas) of a book entitled *Fuzzy and Neural Approaches in Engineering* (1997).

The incredibly accomplished career of Uhrig spanned multiple notable universities, the Department of Defense, and Florida Power & Light, as well as numerous national councils and committees. At each step, Uhrig distinguished himself for his excellent scholarship, his field expertise, and his leadership; he was recognized for his integrity and work ethic.

Stories about Uhrig's tremendous energy and work ethic abound. Dr. J. Wesley Hines, Postelle Professor and Head, Nuclear Engineering, was hired by Uhrig as a faculty member at the University of Tennessee. Hines recalls once when Uhrig had an idea at a conference in DC, he worked all night putting together a proposal, used his printer he took with him in his suitcase, and handed the proposal to a utility executive the next day.

The Uhrig family (back row left to right: Joe; Bob; Fred; Charlie; and Tom. Front row left to right: Jean; Bob Sr. and wife, Paula; and Mary.

Uhrig died June 12, 2013 in Gainesville, Florida, at the age of eighty-four. He and his wife Paula met in Ames, Iowa, where she was a teacher of business at Ames High School. They had been married fifty-eight years and had at one time seven children under seven years old: Robert, Joseph, Mary, Charles, Jean, Thomas, and Fredrick. Joe Uhrig fondly remembers his father and his dedication to the university. "Growing up, when we would occasionally ask him why he was working late, he liked to say, 'Well, I've got to keep the graduate students employed.'"

In that spirit, the Dr. Robert E. Uhrig Endowed Graduate Scholarship in Nuclear Engineering has been established in his loving memory by his family and friends to support a new generation of top nuclear engineering scholars, fostering excellence and achievement.

UT Nuclear Engineering Alumnus Establishes Scholarship

Robbie Hakeem

Robbie Hakeem, MSc DABMP DABR, definitely has a heart for helping nuclear engineering students at the University of Tennessee. Hakeem personally realizes that a strong academic foundation is a launching pad for continued success. In fact, he established the Robbie Hakeem Nuclear Engineering Endowed Scholarship for a deserving nuclear engineering student.

Hakeem received his bachelor of science degree in nuclear engineering in 1992 and his master of science degree, with a concentration in radiological engineering, in 2002. Since that time, Hakeem has been tremendously successful in his career and lives by his company's motto: Excellence is learned. Dedication breeds results.

Hakeem is the CEO of Radphys Oncology Services, LLC, a company he established in 1996. He is an expert in the field of therapeutic radiation oncology and has over twenty years of experience. He currently resides in Knoxville, Tennessee, where he is head of physics for Radphys, a leader in the radiation oncology field. Radphys Oncology Services is one of the larger medical physics groups specializing in radiation oncology, shielding, commissioning and dosimetry. Other areas of the country that the company serves include Georgia, Virginia, and New York. Recently, the company entered a GSA contract with the Veterans Administration system nationwide. Hakeem and his team are well versed in designing oncology facilities from the ground up and integrating new technologies to radiology-oncology and urology-oncology centers.

Hakeem holds certifications on the American Board of Medical Physics and the American Board of Radiology. He is a member of the American Association of Medical Physics and the American Society for Radiation Oncology.

Alumni Profile: Dr. Ken Piety

Ken Piety, Vice President of Technology, Azima/DLI, Builds Life on Foundation of Faith, Family, and Dedication

Ken Piety

Faith, family, and hard work are the foundations of Ken Piety's (*BS/NE '70, PhD/NE '76*) life, and both his personal and professional success can be attributed to his dedication to all three.

Piety was born in Tampa, Florida, where his father was attending college on the GI Bill. The family then moved to Nashville, Tennessee, where Piety attended grade school. Piety's family had a brief stint in Tuscaloosa, Alabama, and then moved back to Tennessee to Murfreesboro, where Piety graduated from Murfreesboro Central High School in 1966. He was valedictorian of his graduating class with a 4.0/4.0 GPA.

Piety initially wanted to major in nuclear physics when he came to the University of Tennessee, but no major in that specific study was available at the time. His advisor suggested that he major in nuclear engineering, so Piety talked with faculty and administration in the College of Engineering and decided to enroll in the NE program.

"As with all of my decisions that I would face in life, I asked God to lead me in the path of His choosing by closing and opening the right doors," Piety said. "I have never questioned that decision once I made it, and my education in the NE department has served me well."

Piety met Linda Gordon during his sophomore year in high school, and the couple came to UT together and married at the end of their sophomore year of college. The two young students faced difficult financial challenges and their parents were not very happy when they decided to marry early, concerned that the newlyweds would not be able to finish college. Piety worked during the summers and had part-time jobs while the school year was going on to help with living expenses. During his sophomore year in college, Piety also began serving as the minister of a small Christian congregation in south Knoxville and after the couple married, they moved into the parsonage beside the church and lived there through the remainder of their undergraduate semesters.

After receiving his bachelor's degree, Piety accepted a position with General Electric's nuclear division at the company's San Jose, California, plant. After working there for fourteen months, Piety was not happy with the job and he and Linda decided that they wanted to pursue working with inner city youth in an outreach program called Shiloh. Several churches in Tennessee raised money for the young couple to help with their expenses during the time that they were involved in the mission work.

"The year we spent opening up a new program site in the inner city of Newark, New Jersey, was dangerous, challenging, and totally fulfilling," Piety said. "In the Shiloh ministry, you moved into ghetto apartments and lived among the people to whom you were ministering, facing the same daily struggles with which they were dealing. We provided tutoring to the children, friendship and support for the mothers, and offered basketball teams for ages up through twenty-four years. This was a fantastic year and I was very fulfilled trying to make a difference in this way. I decided that this was how I wanted to invest the rest of my life and I did not want or expect to ever do any engineering work again."

An opportunity to start a similar Shiloh program brought the Pietys back to Knoxville, but after the move, support for the program eroded. Piety and his wife went ahead and moved into a home adjacent to the Western Heights Housing Development and began reaching out on their own to families in the neighborhood. Urgently needing financial support, Piety contacted the UT nuclear engineering department to see if any jobs were available. Dr. Pietro Pasqua, who was the NE department head at the time, immediately called back and offered Piety a staff position. After working for the department for a year, Piety was afforded the opportunity to enter a graduate program fellowship with a stipend. Although he was not sure that he would ever be using an advanced nuclear engineering degree, Piety accepted the offer, hoping that he would have more time to devote to his ministry activities as a student rather than working in a full-time job.

Piety completed the program in just two years. After receiving his PhD, he accepted a position with Oak Ridge National Laboratory (ORNL) in the Instrumentation and Controls division, continuing research work that he had done for his dissertation. After three years with ORNL, Piety joined a new startup company, Technology for Energy Corporation (TEC), headed by NE alumnus Bert Ackermann and professors Jim Robinson and Julian Mott. The company had a contract with the Department of Energy to implement a state-of-the-art surveillance and diagnostic system on the lead BWR-6 power plant that was being constructed at Grand Gulf Nuclear Station in Mississippi. During his time with TEC, Piety worked with Ron Canada, who was to play an important role in Piety's future professional career.

"Ron Canada had left TEC to start his own company, CSI, and when TEC began experiencing financial difficulties, it was discussed and agreed upon with the management of TEC that I would join CSI and that TEC would license the technology that Ron and I had developed there," Piety said. "I really have never thought of starting or running my own company and was not enamored at all by any expectation that someday there might be significant financial reward. After I had joined CSI, the new TEC board that was controlled by the bank elected to not license the technology to CSI. This turn of events was completely unexpected and forced Ron and I to re-evaluate what options we should pursue. A number of months later, TEC did agree to license the IntelliTrend software to us so that we could adapt it to sell with other vibration analyzers coming to the market from competitive companies. At this juncture in time, the whole concept of intelligent instruments which exchange data with desktop workstations capable of performing advance analysis functions was still very new."

The early days at CSI were stressful as Piety and Canada burned the midnight hours trying to complete their product ideas and create sales to sustain the company. As the company was severely under-capitalized, Canada chose to forego any salary for five months so that Piety could receive a salary and provide for a family that had grown to twelve adopted and birth children.

Canada and Piety enjoyed an incredible working relationship and both worked in a number of different roles in the company beyond engineering. After CSI's first year, the organization experienced thirteen straight years of double-digit growth and Piety and Canada took the company public on the NASDAQ stock exchange in 1993. CSI grew from a company of a few individuals to about five hundred and fifty employees with annual sales of about $70 million. CSI became a worldwide leader and developed products in many related condition monitoring technologies and were awarded forty to fifty patents. They sold the company to Emerson in 1997.

"Both Ron and I agreed to a five-year employment contract as a condition of the buyout," Piety said. "Ron developed significant health issues over the next year resulting in his resignation from the company. I worked out my employment contact and left CSI in 2001. Emerson is a great company and I certainly profited financially from the situation; however, I did miss the freedom to pursue new ideas and products that had been present when Ron and I were the majority shareholders."

He currently is the vice president of technology for Azima DLi and works from an office in his home. He directs a group of about ten engineers located in Seattle and one employee in Boston, which is the location of the company's corporate office.

Ken and Linda, in the meantime, had followed through on their dream to parent many children, and the original plan was to have a big family of six to eight kids. The couple began adopting biracial and special-needs children, and their family eventually expanded to nineteen in a five-bedroom house that eventually had to be expanded to nine bedrooms.

"I became more and more certain that God was showing us in some clear way that the children that were coming to us were from Him. Every one of our children has his or her own story," Piety said. "We were not able to buy new cars or furniture or take vacations, but we saw God provide for us financially and meet our needs when it was hard to make the math work. Our family has grown to twenty-nine children presently and we now have twenty-six grandchildren. About a third of our children are white, a third are black, and a third are biracial. We have three sons from Russia, a daughter from Guatemala, and two children from Africa. Our family encompasses significant diversity in intellectual and physical abilities; we have children who are gifted all-state and college athletes and children who are quadriplegics and require a power wheelchair to achieve any mobility. We have children who are extremely bright and others with profound intellectual disabilities. Many of our children have experienced significant trauma from abuse, neglect, abandonment, and rejection. We have some miraculous stories and we have had disappointing failures where we were unable to understand or unable to provide what that specific child needed to overcome his struggles. We currently still have twelve children living at home. They range in age from ten to forty-nine years of age. Three are in college, three in high school, two are being home-schooled, and we have three adult children who are physically or intellectually disabled. All of these children are officially adopted–we do not foster, we actually go through the adoption process with each one."

Piety used the profits from the sale of CSI to purchase an extensive amount of land in the Karns community and built a large, custom-designed home for his large family. The compound includes barns and is home to goats and other animals. Piety and Linda have now been married for forty-six years.

"After selling CSI to Emerson, we were financially able to build a new home that is completely handicapped accessible and a farm. This setting allows us to continue to do what God has called us to do, which is to make a place for people to experience His love," Piety commented.

Piety Third Student To Have Four Year Record

KNOXVILLE (UPI)— There's no doubt about who's at the head of the class, gradewise, as 1,635 students receive degrees in commencement exercises at the University of Tennessee here today.

Kenneth Ralph Piety, a native of Murfreesboro, has become the third student in UT's 75 - year hi y to maintain a perfect 4.0 grade point average throughout his undergraduate career.

Retiring UT President Andrew D. Holt will be the main speaker.

Piety will receive a bachelor of science degree in nuclear engineering. He says that if he has a secret to success it is "remembering always to just do your best."

The scholar's wife, Linda, will be getting a degree in elementary education at the same time. Her average was a 2.96 for the four years.

The head of UT's nuclear engineering department, Dr. P.F. Pasqua, describes Piety as a "terrific student — enthusiastic and energetic.

"He's not just a bookworm either. He has an excellent personality. But being an extremely modest person, he is quite reluctant to talk about his many academic achievements."

In addition to his perfect academic record, Piety is a full-time minister at Neuberts Church of Christ, vice president of Tau Beta Pi, and has been active in the UT branch of the American Nuclear Society.

He says he will continue his studies on a parttime basis while working with General Electric Co. in San Jose, Calif.

The first UT graduate to have a 4.0 average was Dr. William Everett Derryberry, now president of Tennessee Tech University at Cookeville. The other was David Stuart Fonde, who lives in Los Angeles and graduated in electrical engineering in

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1952.

He played guard on the Central basketball team which won the State Champeionship and he also played Little League and Babe Ruth baseball and worked for the city recreation department.

He is a Central high school graduate.

Kenneth R. Piety

A newspaper clipping about Ken Piety's GPA perfect 4.0 GPA that he held throughout the four years he was working towards his bachelor of science degree in nuclear engineering.

SPECIAL FEATURE:

Future Site of Alumni News

Please send us your career announcements so we can share them with other NE alumni. Send your information to *utne@utk.edu* and include your name, degree, and year of graduation.

THE UNIVERSITY of TENNESSEE KNOXVILLE
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NE faculty Member Receives Research and Creative Achievement Award at the 2014 Annual Chancellor's Honors Banquet

Chancellor Jimmy G. Cheek (right) presents the UT Professional Promise Award to Dr. Jason Hayward at the Chancellor's Honors Banquet.

The annual Chancellor's Honors Banquet is a showcase of the best and brightest at the University of Tennessee, and the 2014 edition proved to be quite a night for students and faculty of the College of Engineering.

The college had three faculty members win Research and Creative Achievement awards, including Department of Nuclear Engineering assistant professor and UCOR Faculty Fellow Jason Hayward, who earned a Professional Promise award for the research into nuclear safety, arms control and nonproliferation.

Department of Nuclear Engineering Wins First UT-COE Halloween Spirit Challenge

Ahoy, mateys! The Department of Nuclear engineering Pirate Team took first place at the UT-COE Halloween Spirit Challenge in 2013.

Faculty and staff from the Department of Nuclear Engineering (NE) won the inaugural UT COE Halloween Spirit Challenge on October 31, 2013. The challenge, also called the "Battle on the Bridge," took place between NE and the occupants of the new John D. Tickle Building: the Department of Industrial Systems Engineering (ISE) and the Department of Civil and Environmental Engineering (CEE).

The NE team's theme was "Pirates," as they were attempting to "take over" the walkway bridge to the Tickle building. They were successful and were crowned "winners" by a team of COE staff judges, who presented them with a now-coveted Halloween trophy. Nuclear engineering faculty and staff thanked their able competitors and plan on defending their title in this Halloween.