



One of the most sought-after educational experiences for engineering physics students is the chance to operate the controls of UW-Madison's nuclear reactor.

This hands-on learning with the nuclear reactor is a big reason why NE 234: *Principles and Practice of Nuclear Reactor Operations* is an immensely popular elective course, according to Bob Agasie, nuclear reactor director.

Agasie says students who complete NE 234 have an edge in the job market because they have firsthand experience seeing how a reactor actually behaves as they manipulate the controls. They also gain a strong understanding of the physics behind a reactor.

For those NE 234 students who want to go on to become licensed reactor operators, Agasie offers an independent study program to prepare them to take the Nuclear Regulatory Commission's licensing exam. And when the students pass their licensing exam, Agasie hires them to help staff the reactor and supervise future NE 234 students on the reactor. "We rely heavily on that core group of licensed students serving as reactor operators for us," Agasie says.

"When my students who get licensed on the reactor go out in industry, they're not seeing anything for the first time," he says. "That puts them a notch above any other student who graduates with a nuclear engineering degree."



Hands-on nuclear reactor education gives students an edge

However, the hands-on aspect makes teaching NE 234 a huge time commitment for a permanent reactor staff of two. Regulations require a licensed reactor operator to be present at all times while the reactor is operating and students are at the controls. Sixteen students can enroll in the course each time it's taught, but only two students can operate the reactor at any given time, and they do it in one-hour windows. Even with help from

licensed student operators, Agasie says the department can only offer NE 234 every other year because he and the reactor supervisor must cover the classroom instruction and laboratory experiences.

Agasie says that every time the course is offered, anywhere from 40 to 70 students want to enroll. "We have to turn away a lot students who really want to take the class," he says.

The department is seeking ways to better meet the demand for the course. One way to do that, if additional funding was available, would be to hire a full-time instructional staff member so the department could offer the course more often.

Agasie says the experience of operating the reactor can have a big impact on a student's educational experience and career direction.

"Every student I've had who has been a reactor operator here, when they leave to take a job, they say this the best choice they made in college, and they're so happy they had this opportunity and are really appreciative for it," he says. "And, to date, we still get people who come back to visit the reactor 20 years later, saying just that. I find that's the most heart-warming thing about it."

To make a gift, please contact Aaron Mullins, (608) 890-1486, aaron.mullins@supportuw.org.



Max Carbon

Max Carbon Fund benefits department in numerous ways

Professor Emeritus Max Carbon has made many substantial contributions to the department over the years, including creating the Max Carbon Fund.

He established the fund in 2005 to give the department full discretion over how the money is used. In addition to supporting student scholarships, the fund gives the department the important flexibility to use the money in high-impact areas as needed.

"Funds such as the Carbon fund are a great asset for the department," says College Executive

Associate Dean and Duane H. and Dorothy M. Bluemke Professor Jake Blanchard, who recently concluded his term as department chair. "We use it to, among other things, recruit top students, reward our top achievers, support hands-on design experiences, help students travel to conferences, subsidize study-abroad opportunities and recruit new faculty."

Blanchard says donations to the Max Carbon Fund are an excellent way to support the department while also honoring Carbon.

Carbon, a veteran of World War II, was the founding chair of the Department of Nuclear Engineering. He was hired in 1958 as part of a

growing postwar research emphasis on designing better, more efficient nuclear power plants for generating electricity.

Department chair from 1958 until his retirement in 1992, Carbon led the department in establishing the nuclear engineering bachelor's, master's and PhD curricula; and recruited and hired top faculty and staff, an effort that has elevated the program to its current status as among the best in the nation. Carbon also oversaw construction of the university research and training reactor, which achieved initial criticality in early 1961.

I am very optimistic about the future of our department. At one point recently, we had no assistant professors. However, things look much better now, thanks, in large part, to an aggressive hiring approach taken by College of Engineering Dean Ian Robertson. We now have four bright, young assistant professors in the department, spanning all of our major research areas, and they've already had an impact on our programs. The first recent hire was Oliver Schmitz, a plasma physicist specializing in edge physics for toroidal devices. Despite having been here less than one year, he already has a substantial research group and he received a prestigious CAREER award from the National Science Foundation. Next we hired Raluca Scarlat, an expert in safety and thermal hydraulics for fission reactors. Raluca came to us from Berkeley and she, too, has a substantial research group, despite only arriving a few months ago. Next we hired Jacob Notbohm, who received his bachelor's degree with us in engineering mechanics before moving on to Cal Tech for his PhD and Harvard for a postdoc. Jacob studies the mechanics of live cells and he will begin this summer. Our most recent hire is Adrien Couet,



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who earned his PhD from Penn State and is now at EDF in Paris. Adrien is an expert in fission fuel cladding and corrosion and will start in December 2015.

One more news item concerns the chairmanship of the department. I've accepted a position as executive associate dean of the College of Engineering and Professor Douglass Henderson will take over as just the fourth chair since we merged the nuclear engineering and engineering mechanics departments almost 20 years ago. I'm sure he'll do a fine job. It's been a pleasure being chair of the department; the faculty and staff are talented, collegial, forgiving and supportive. A chair can't ask for much more.

Finally, I'd like to say thank you to all of you who have donated to our department gift funds in recent years. Especially given our current budget challenges, these funds will be very valuable as we provide scholarships to our undergraduates, provide startup funds to our outstanding new faculty members, recruit new faculty, provide more hands-on and design experiences for our students, and expand undergraduate access to our reactor.

Professorship fuels educational innovation

Endowed professorships enable faculty to explore promising new research opportunities, but they also significantly support a professor's teaching mission.



Greg Moses

Harvey D. Spangler Professor Greg Moses says the funding he receives from the professorship gives him a lot of flexibility in choosing what he spends his time doing, and that makes it much easier to get involved in

projects and other high-impact activities that otherwise wouldn't be possible.

For Moses, many of those high-impact projects involve developing innovative teaching and educational initiatives to enrich student learning.

He uses the professorship's discretionary funds to support both undergraduate and graduate students who help with his teaching and learning projects. Moses is developing a new online course that teaches students how to use the Maple software program to solve engineering problems. It's part of a set of three one-credit courses being developed to train students on using different computing tools—Maple, EES and LabVIEW—in their engineering careers.

"This is the beginning of a curriculum initiative to give students an introduction

to online courses in preparation for lifelong learning," Moses says. "Very frequently, once in the workplace students will advance their careers with online courses, so we feel it is valuable to give them this experience while here at UW-Madison."

Although Moses is receiving some support from the college for this project, he says the additional discretionary funds will make a difference in the value and impact of the course. "I'm able to go a lot further with the course than

just the minimum that's needed to prepare an online course. The funding from the professorship provides an increment of excellence that isn't necessarily funded by the baseline funding," Moses says.

The professorship supports Moses' teaching in other ways, too. For example, colleague Douglass Henderson recently became department chair, and as a result of his new responsibilities, needed a lighter teaching load. Because of time flexibilities the professorship offers him, Moses volunteered to teach one of Henderson's courses in spring 2015 in addition to his own courses. "The course

is on a topic that I am able to teach, so I volunteered to do it. I felt it was the right thing to do, because otherwise the course probably would have been canceled," Moses says.

"Too often people think that professorships allow faculty to explore research at the expense of our teaching mission. I use the Spangler professorship in a balanced way supporting both research and teaching," he says.

Moses says the professorship allows him to explore leading-edge activities, rather than simply following more traditional lines of teaching and research.

"It gives you an edge in terms of getting out in front on emerging areas, and I think that delivers a much higher impact than if you were simply confined by the available funds in the college or the campus or in some federal agency," he says. "It allows you to do things that haven't yet been

Investing in faculty excellence is a college priority—and one way we can attract and reward star faculty is through endowed professorships. Currently, approximately one-quarter of our engineering faculty members hold a professorship or chair—and our goal is to greatly increase the number of endowed professorships for both junior and senior hires.

A gift to the university will enable us to realize that goal: Alumni John and Tashia Morgridge made a landmark \$100 million gift to UW-Madison in support of faculty excellence—and that gift provides a dollar-for-dollar match to other donors who make a gift to endow a professorship (\$1 million), a chair (\$2 million) or a distinguished chair (\$3 million).

To make a gift, contact Cathleen Walters, COE associate dean for advancement, (608) 265-8021 or cgwalters@wisc.edu.



From left to right: Charles Johnson (son), Ruth Johnson (wife of Millard W. Johnson Jr.), and Millard Johnson III (son). Jeannette Brooks (daughter) and Peter Johnson (son) (not pictured) also support the fund.

Scholarship honors professor's legacy

Throughout his long and distinguished career as a professor of engineering mechanics and mathematics, Millard Johnson Jr.'s devotion to the university, his department and his students was evident, especially to his family. "He instilled in us a true love of learning and the importance of UW-Madison and the many contributions the university makes to the world," says his son, Millard Johnson III.

Johnson Jr.'s teaching, research and his engineering mechanics department, now part of the Department of Engineering Physics, were so important to him that when he passed away in 2009, Johnson III says family members decided the best thing they could do in his memory was to help engineering students earn degrees from UW-Madison. The family established the Millard W. Johnson, Jr., Scholarship to honor his legacy.

Johnson Jr. graduated from Racine Horlick High School as valedictorian of his class and served in the U.S. Navy from 1946 to 1948. After an honorable discharge, he began his undergraduate education at Carlton College in Northfield, Minnesota, and earned a bachelor's degree in 1952 from UW-Madison in applied mathematics and mechanics.

He earned a PhD in mathematics from the Massachusetts Institute of Technology in 1957. He returned to UW-Madison as a faculty member and spent his career at the university. He was an expert in continuum mechanics, viscoelasticity, lubrication, theory of thin bodies, and the mechanics of paper.

Johnson Jr.'s love for UW-Madison was certainly passed on to his family. "Growing up, around the dinner table, my dad would often have conversations about math and science and what's going on at the university, and we just developed a real love for the university before we even attended," Johnson III says. "It was a place that we all aspired to attend. When I was ready to apply to schools, UW-Madison was the only school I ended up applying to."



Ben Zastrow

The list of family members who graduated from UW-Madison is long. Johnson Jr.'s brother, Chuck Johnson, received a civil engineering degree from UW-Madison. Johnson III graduated from the UW-Madison School of Business, and his wife, Mary, their daughter, Lindsay, and their son, Kale, all have degrees from UW-Madison. Johnson III's brother, Charles Johnson, earned his bachelor's and master's degrees in engineering mechanics from UW-Madison, and his wife, Beth, and daughter Kelsey are also UW-Madison grads. Johnson III's sister, Jan, has art and nursing degrees and her husband, Greg Brooks, earned his bachelor's and doctor of medicine degrees, also from UW-Madison.

Many of Johnson Jr.'s grandchildren, several of whom have also graduated from UW-Madison, have also continued to contribute to the scholarship fund. "We're definitely Badgers through and through," he says.

Ruth Pugh Gifford Johnson, Johnson Jr.'s wife of 55 years, also remains active with the university. This year, as chair of the fund-raising committee for the University League, she is helping to raise money for student scholarships.

"We just feel very blessed with the education that we all received at the university, and it's been a real honor to be in a position to fund this scholarship and help a really worthwhile cause," Johnson III says. "For us it's a small way of giving back, but it's brought us a lot of joy."

The scholarship awards between \$1,000 to \$2,000 to a student each year. The most recent scholarship recipient, Ben Zastrow, a sophomore in the engineering mechanics program, says he felt honored to be chosen for the scholarship, and he is putting the money toward his tuition. "It was really helpful to receive this money to relieve some of financial burden of tuition," he says. "I'm very grateful to the Johnson family for this scholarship and truly appreciate it."

done. Oftentimes, making an impact is related to just being the first one, and so this gives you a chance to jump in."

Moses says he greatly appreciates alum Harvey Spangler's generosity in endowing the professorship. "It's a huge honor to hold this professorship. It has become more and more important for the college to have these professorships to ensure our continued excellence in engineering education and research," he says.

A native of Loyal, Wisconsin, Spangler earned his bachelor's degree in chemical

engineering in 1956. He was an engineer in the refinery, ammonia and fertilizer areas of what is now the Exxon Research and Engineering Company and later worked at Farmland Industries.

Spangler, who passed away in 2007, gave generously to UW-Madison over the years and considered each gift an investment. "It's an investment in the future of our country, really," he once said. "As a nation and as a college we have to be able to compete in the world. The college can compete much better if they have great faculty than if they don't."

www.engr.wisc.edu/ep/giving

Thank you for your continued support of the UW-Madison Department of Engineering Physics.

If you'd like to make a gift, you have a variety of options, including estate gifts, matching gifts, endowments, and an immediate gift. If you are considering a gift, please contact:

Aaron Mullins, Director of Development
(608) 890-1486
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Save the dates!

Each year, the College of Engineering hosts several alumni events around the country. Save the date for an event near you—and if you'd like us to add you to the invitation list for a specific event, please contact Stephanie Longseth, (608) 265-3496 or slongseth@wisc.edu.

January 13—Houston, TX

February 18—Bonita Springs, FL

March 26—San Francisco, CA

May 21—Seattle, WA

June 26—Chicago, IL

July 17—Fox Valley, WI

August 20—Twin Cities, MN

September 15—Milwaukee, WI

October 4—Washington, D.C.

October 16—Madison (*Engineers' Day*)

TBA—San Diego, CA



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Gabriel Meric de Bellefon's experience working in industry before returning to school for his PhD helped inform the research direction he wanted to pursue in his PhD work.

But his research focus is in an area that isn't currently getting much attention in the nuclear engineering and materials communities, so there aren't many calls for proposals or funding opportunities available to support this research.

That's where the Jack and Marion Goetz Engineering Fellowship in the Department of Engineering Physics has helped. Meric de Bellefon received the fellowship, which is providing essential funding for him to get started on the research topic he's passionate about.

"The idea that I want to pursue is a topic that's been largely studied in the 1970s until the early 2000s by Oak Ridge National Laboratory and several U.S. universities, but the effort has slowed down since then," he says. "It's slowly coming back, but there's not much going on currently, so this fellowship funding is very valuable to help me get started."

Meric de Bellefon says the fellowship allows him to do the necessary work to build successful research proposals and publish papers on the topic so that he can get his research funded through traditional channels like the Department of Energy.

His research topic involves studying why stainless steel, an important material inside nuclear reactors, loses its ductility under high reactor temperatures. As stainless steel in a reactor is damaged by radiation, it will lose even more ductility, which can reduce safety margins.

"I'm basically working on making a stainless steel that's more radiation-resistant because it's more ductile," he says. "Radiation-resistant steel is

a big thing, and many people have worked on that topic. They generated a lot of results and data that has not been fully taken advantage of. I want to try an innovative approach that uses the latest data-driven methods to take advantage of all the experimental and operational data that is out there."

Meric de Bellefon, who earned his master's degree in nuclear engineering from the University of California-Berkeley, says the next

five years he spent working in R&D in the energy sector helped him develop his research topic. That experience also gave him a strong understanding of how to propose and run

Fellowship empowers PhD student to pursue novel research

successful research projects. "Starting out as a PhD student with years of experience in industry, I wanted to be able to propose some original research and go for it, and this fellowship allows me to do that," he says. "I'm very appreciative of this funding."

John (Jack) E. Goetz received his BA in 1930 in accounting, business and management from the UW-Madison School of Business and later acquired his CPA. He was a member of the UW Marching Band, of the fraternity Phi Eta Sigma, and of the Beta Alpha Psi academic honor society.

Goetz worked for the state of Wisconsin for 46 years. He served in several key fiscal and administrative positions including deputy director of the state Department of Budget and Accounts, deputy director of accounting in the Department of Administration and comptroller for the Wisconsin Department of Natural Resources. He died in 1995 at the age of 86.



Meric de Bellefon