



Educating Future Professionals – M. Eng. and M.S.

The College of Engineering has launched a new series of year-long, non-thesis, resident master’s degree programs. Among the first is an M. Eng. in Engineering Mechanics, enrolling now for Fall 2015.



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Dean Elnashai continues to spearhead innovative new ventures in the College of Engineering. One of his latest is the development of a new suite of professional master’s degrees that can be completed in one year.

Priced at \$34,000 for both in-state and out-of-state students, the new M.S. and M. Eng. degrees are ideal for engineers seeking a compressed, intensive research program. In lieu of a master’s thesis, students complete an independent research project or expanded paper. For those interested in pursuing a Ph. D., the degrees are fully compatible.

Among the first degrees to be offered in the new suite is an M. Eng. in Engineering Mechanics, to be offered starting in Fall 2015 through the ESM department. This highly interdisciplinary program represents an excellent opportunity for an engineer holding a bachelor’s degree to rapidly expand his or her knowledge of cutting-edge mechanics while earning a valuable professional credential.

With courses identical to those in the M.S. and Ph.D. programs, the M. Eng. degree offers students a wide variety of topics. Examples include: biomechanics; brain mechanics; structural mechanics; energy, civil and transportation infrastructures; power plants

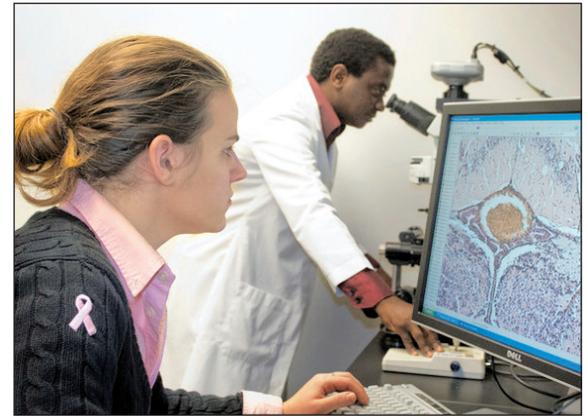


Photo credit: Patrick Mansell

and piping; mechanics of materials; and multiscale computational mechanics.

Companies may consider the M. Eng. degree as an outstanding professional development experience for their most promising employees. With access to ESM’s world-class faculty and laboratories, engineers can spend a year working on solutions to their industries’ most challenging problems.

Three more one-year professional degrees are planned for 2016: an M.S. in Engineering Science and Mechanics (ESMCH); an M.S. in Engineering at the Nanoscale; and an M.S. in Structural Integrity Engineering.

Learn more about our new programs at www.esm.psu.edu/professional.

Message from the Chair



After a successful major night, our student totals increased to 150 undergraduates and 125 graduates. Congratulations to junior Amel Awadelkarim, who placed first in the Leonhard Center Speaking Competition with her presentation

“The Application of Robotics and Additive Manufacturing in Construction.”

ESM welcomes Melissa Showalter, our new Coordinator for Development and Alumni Relations, following Emily Gallagher’s promotion to the College of Engineering’s Alumni Office.

Recent staff promotions include Carrie Friday to Administrative Assistant and Melissa Fink to Graduate Assistant. Bonnie Hebden recently joined ESM’s budget office and Kristin Fink started as ESM’s Undergraduate Coordinator in November.

Dean Elnashai’s initiatives have provided: \$209,000 in equipment support for the ESM/Biomedical biomechanics laboratory; \$50,000 for M.S. degree development; multiple summer research experiences for undergraduates; a \$50,000 research innovation grant to Francesco Costanzo’s team for their project *“Waste Disposal in the Brain: Fluid Exchange Mechanics in the Glymphatic System”*; and a graduate teaching fellowship. This support is having a major impact on our activities.

We are pleased to announce that professor Sulin Zhang has been appointed associate editor of a new journal, *Extreme Mechanics Letters*, published by Elsevier.

As the holiday season approaches, we thank you for all your support and wish you a very Happy New Year.

Warm regards,

Judith A. Todd

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Faculty Spotlight

Long-Qing Chen, distinguished professor of materials science and engineering and ESM, received the Materials Research Society’s (MRS) 2014 Materials Theory Award.



The award recognizes exceptional advances made by materials theory to the fundamental understanding of the structure and behavior of materials. Chen was cited for his pioneering work in the development of the phase-field method and its applications to the computational modeling of mesoscale structures and their dynamics in homogenous materials.

He received his award, consisting of a \$5,000 prize, trophy and citation certificate, during the MRS fall meeting in December in Boston, Massachusetts.

Graduate Spotlight

Graduate student Jeremy Schreiber has been selected as a non-voting student member on the Thermal Spray Society (TSS) Board of Directors for a one-year term.



TSS is an affiliate society of ASM International. The TSS Board of Directors focuses on increasing global exposure of thermal spray, engaging industry and academic leaders in society, as well as promoting thermal spray technology.

Schreiber received his B.S. in materials science and engineering from Penn State in 2011 and M.S. in engineering science and mechanics from Penn State in 2013. He is currently pursuing a Ph.D. in engineering science and mechanics.

Undergraduate Spotlight

Junior Sarah Masters has been awarded a Department of Defense (DOD) Science, Mathematics and Research for Transformation (SMART) Scholarship.



Part of the National Defense Education Program, the SMART Scholarship for Service Program was established to support undergraduate and graduate students pursuing degrees in science, technology, engineering, and mathematics disciplines.

Administered by the American Society for Engineering Education, the program aims to increase the number of civilian scientists and engineers working at DOD laboratories.

Awardees receive a full scholarship and are promised a position at a DOD research facility after graduation. Masters’ sponsoring facility is the Marine Corps Systems Command (MCSC) in Quantico, Virginia. She will complete a summer internship at MCSC in 2015 and be employed there after completing her degree.

Dages elected chairman of National Academy Board of Trustees



The governing Board of Trustees of The National Academy of Television Arts & Sciences (NATAS) has announced the election of Charles (Chuck) L. Dages ('77 M.S. E SC), former Warner Brothers Executive Vice President of Emerging Technology, as Chairman of the Board.

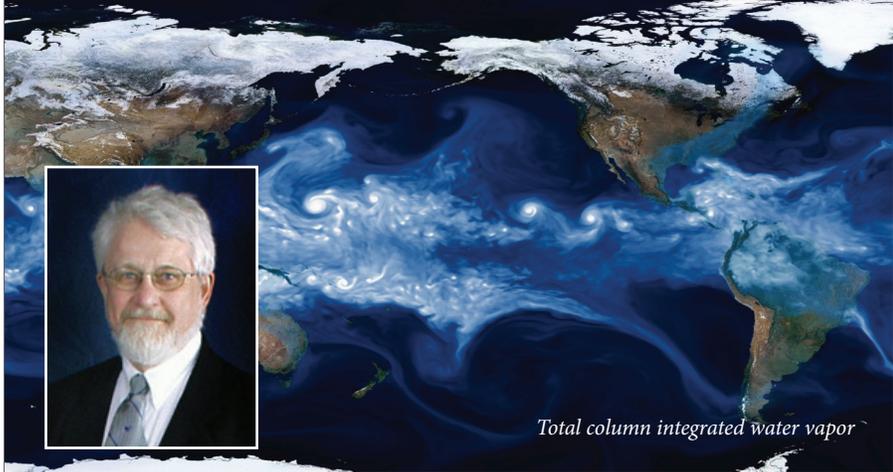
Dages will work with the Executive Committee and the Board of Trustees on all major programming, sponsorship, and marketing of the non-profit organization and securing its mandate of recognizing excellence in the television and media industry.

NATAS recognizes excellence in television with the coveted Emmy® Award for News and Documentary, Sports, Daytime Entertainment, Daytime Creative Arts and Entertainment, Public and Community Service, and Technology and Engineering. NATAS membership consists of over 13,000 broadcast and media professionals represented in 19 regional chapters across the country.



ESM Department seeks two new faculty

The ESM department has openings for two new faculty members; one in Additive Manufacturing and one in Health Monitoring of Systems, Structures, and People. Position and application details are posted at www.esm.psu.edu. Candidates may be eligible for the Dean's Frontier Faculty Lines. Learn more at www.engr.psu.edu/growth/. Apply now!



Total column integrated water vapor

Hummel heads new center at Argonne National Laboratory

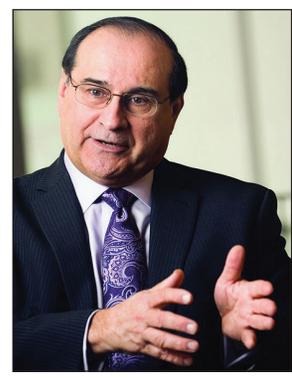
The U.S. Department of Energy's Argonne National Laboratory is forming a new research center to enhance resiliency for major disruptive events, such as natural disasters and climate change. The Center for Integrated Resiliency Analyses (CIRA) will be led by ESM alumnus and Argonne researcher John Hummel ('73 E SC, '75 M.S. EMS).

Hummel is a modeling and simulation expert focusing on national security analyses, such as climate and environmental impacts on national security.

Read more about how the newly created center will help officials begin to plan for the effects of climate change on their regions at www.esm.psu.edu/news/item/1353.

Image credits: Michael Wehner, Prabhat (sic), Chris Algieri, Fuyu Li, Bill Collins, Lawrence Berkeley National Laboratory; Kevin Reed, University of Michigan; Andrew Gettelman, Julio Bacmeister, Richard Neale; National Center for Atmospheric Research

Blakeslee, executive director of JHU Tech Transfer Office, retires



Wesley D. Blakeslee ('69 E SC), who served as executive director of the Johns Hopkins University (JHU) Technology Transfer Office since 2006, retired at the end of July.

Blakeslee joined JHU in 1999 as associate general counsel responsible for legal issues involved with intellectual property, technology licensing, sponsored research agreements, and export and import controls. Prior to this, he spent 15 years as the chief executive officer of Blakeslee, Wallace and Associates. Before his law career, Blakeslee was an engineering manager at NASA.

ESM RESEARCH HIGHLIGHTS



Researchers receive \$3M DOE award to advance nuclear technology

Five Penn State researchers are part of an interdisciplinary team awarded a three-year \$3 million Integrated Research Project award from the Department of Energy.

Cliff Lissenden, professor of engineering science and mechanics, is principal investigator (PI) and Arthur Motta, professor and chair of nuclear engineering, is co-PI. Their project is titled “Multi-Sensor Inspection and Robotic Systems for Dry Storage Casks.”

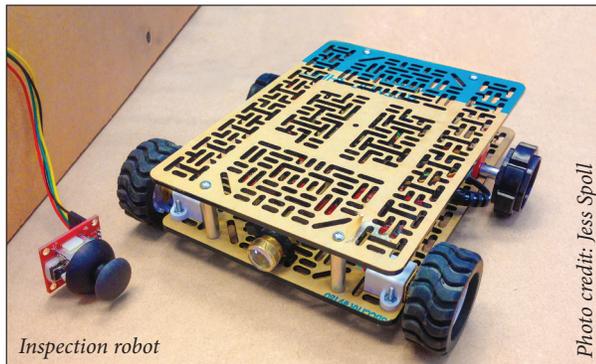
The team’s research aims to develop methods for assessing the potential for environmental degradation of casks containing used nuclear fuel. “Until a permanent repository for nuclear waste becomes available, these casks may be kept in dry storage for prolonged periods,” said Lissenden. “Inspection will be a challenge as we must check for degradation of the metal canister

and its concrete overpack. The most critical locations within the cask will be difficult to access.”

New technologies will be developed, including advanced sensors capable of finding deposited salts, dust and reaction products by surface sampling, and guided wave ultrasonics to locate damaged regions, corrosion pits and cracks. Robotic delivery devices will enable the inspection of the sensitive regions of the canister. Environmental conditions such as radiation field and temperature will also be assessed, for benchmarking.

The devices will be designed in our laboratory, then field tested in collaboration with industry partners from Oak Ridge National Laboratory, Pacific Northwest National Laboratory, the Electric Power Research Institute and Holtec International.

The team also includes Penn State’s Igor Jovanovic, nuclear engineering; Sean Brennan, mechanical engineering; and Karl Reichard, Applied Research Laboratory. Other researchers include Illinois’ John Popovics and South Carolina’s Travis Knight.



Inspection robot

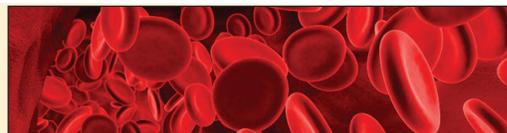
Photo credit: Jess Spoll



CTSI awardees develop model for clot removal

Research teams in the Penn State College of Medicine and at the University Park campus have received grants from Penn State’s Clinical and Translational Science Institute’s (CTSI) recent Novel Methodologies in Health Research Program. Nine research projects received more than \$400,000 from CTSI.

ESM professor Francesco Costanzo and his research team are developing a model for clot removal in the treatment of acute stroke. Clot removal following acute stroke is successful only in approximately 80 percent of cases, with a good clinical outcome in only 50 percent of patients. Barriers to fast, effective, cerebral thrombectomy arise due to the mechanical properties of clots and their adhesion to arterial walls. A promising new approach to clot removal from a cerebral artery has been proposed by the group working with Scott Simon, a neurosurgeon at Penn State Hershey Medical



Center, in which the clot is attacked via an alternating pressure mediated through blood or saline until the thrombus, a fibrin polymer, fatigues, fractures, and dissipates.

Taking this new technique to clinical practice is challenging and cannot be done by simple “trial and error.” It is in these difficult cases that computer modeling can offer a way forward that cannot otherwise be found by intuition or trial and error. Simon (Co-PI) has joined forces with Costanzo (PI) and ESM professor Sulin Zhang (Co-PI), for the development of a computational model of the clot-artery system under cyclic loading as applied by a catheter. This award creates an exciting opportunity to bring together research in engineering and medicine to develop new technologies that can be applied in the operating room during surgery.

ESM Frontiers

Undergrad's Rapid Prototyping Venture Shows Rapid Growth

Engineering science senior Joseph Sinclair's business, Solid Dynamics, LLC, utilizes the latest techniques in additive manufacturing to design and produce quality products.



Joseph Sinclair is one busy Penn State student. The senior is majoring in mechanical engineering, nuclear engineering, and engineering science, simultaneously. His new startup, Solid Dynamics, LLC, is a rapid prototyping service that employs the latest techniques in additive manufacturing to design and produce unique products.

Sinclair bought his first 3-D printer following his high school graduation. Shortly after arriving at Penn State, he began manufacturing custom iPhone cases for his friends. By the end of his sophomore year, he was running four machines and had hired other students to help keep them running.

An online five-star product review from one of Sinclair's early customers provides a window to his success. "I bought a custom phone case and it is awesome," it reads. "It is very cool to know I am the only one in the world who has a phone case like this!"



For Sinclair, paying his way through school was a prime motivator for all this entrepreneurial activity, along with

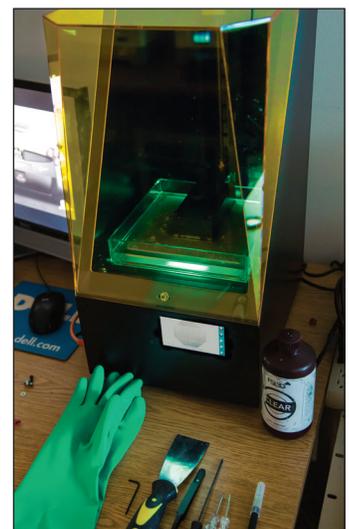
"There is no other term but limitless... We are just at the tip of the iceberg when it comes to the possibilities of 3-D printing."

his innate creativity and energetic drive. Being a natural-born engineer, who enjoys dismantling objects to learn their inner workings, has proven to be critically important to his success.

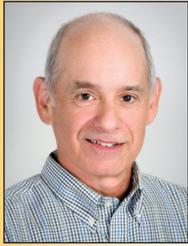
Solid Dynamics' first client was VorTic LLC, a company also run by current and former Penn State students, which wanted a prototype of their unique watch components. The functional 3-D printed models Sinclair printed for his client contributed to their team winning the Department of Mechanical and Nuclear Engineering Boeing Innovation Competition.

Since Solid Dynamics, LLC opened in January 2014, he has hired a team of undergraduate engineering students to assist with the client workload. When not developing products for clients, the Reading, PA-area native is currently working on artificial intelligence for 3-D printers and exploring ideas that he hopes will contribute to society.

"There is no other term but limitless" for the applications of additive manufacturing, Sinclair said. "We are just at the tip of the iceberg when it comes to the possibilities of 3-D printing."



Message from Your Alumni Society Chair



Dean Elnashai's new strategic plan for the College of Engineering emphasizes our college's mission to nurture and train world-class, socially aware, and globally connected engineers and researchers. Focus on interdisciplinary education and research is critical in arming our

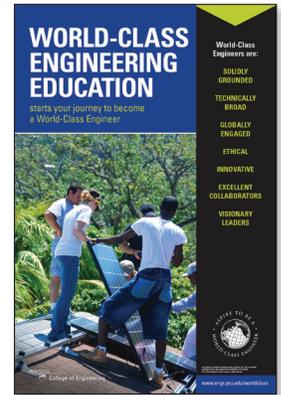
students to address societal challenges and to enhance quality of life. For our reputation to advance, we must produce engineers with outstanding academic backgrounds *and* willingness to go out into the world and realize this mission. As ESM alumni, we can add to our students' experiences in both of these areas. I believe ESM and our alumni base is well-positioned to do this.

Your Board continues to work hard supporting our ESM students. In September, we held a career panel. More than 20 students attended and asked great questions that were answered by a panel of eight Board members and several other Board members in the "peanut gallery." One recurring question is always how to promote an E SC degree to employers. As a result, we resolved to develop materials to help students advertise and promote E SC. Finally, we are hoping to find ways to get more companies with ESM graduates to attend the ESM Recruitment-By-Industry mixer in the fall.

Based on compiled results of the survey sent with the last *Connections* newsletter, we are happy to report that more than half of the respondents indicated a willingness to interact with students and more than

one third indicated a desire to share their career experiences in our *Connections* highlights section. These respondents will be contacted shortly.

Rick Schutz
(72 E SC)



Golden Decade 2015 ESM ALUMNI REUNION JUNE 4 & 5

ESM's Golden Decade Reunion will be held June 4-5, in conjunction with Penn State's Alumni Reunion Weekend. All alumni are invited to enjoy ESM's celebration banquet recognizing alumni who graduated in '65, '70, '75, '85, '95, and '05, as well as 2015 graduates.

To RSVP, visit www.esm.psu.edu/alumni/reunion

ESM Early Career Recognition Award

The ESM Alumni Society is seeking nominations for the Early Career Recognition Award. This award honors alumni who have graduated in the last 10 years and have distinguished themselves at work or in their communities. Nominations, including self-nominations, will be accepted through February 21, 2015 at www.esm.psu.edu/alumni/honorees

Contact ESM

Name	Department	Phone	E-mail
Judith A. Todd	Department Head and P. B. Breneman Chair	814-863-0771	jtodd@psu.edu
Rick Schutz	Alumni Society Chair	703-451-3827	raschutz@yahoo.com
Melissa Showalter	Alumni, Development, and Advancement	814-867-1569	mus41@psu.edu

