Chair’s Message

Earlier this year, two outside experts from top geoscience programs began conducting an external review of the EES Department in order to make recommendations to Michael L. Klein, FRS, dean of the College of Science and Technology.

The department’s most recent external program review occurred in 2007; much as happened in the ensuing decade. In accordance with their recommendations, EES established a new PhD program, increased research funding, purchased modern equipment and nearly doubled its number of faculty members.

Included in the new self-study document we prepared for the reviewers is a faculty timeline (see below). Perhaps, alumni will enjoy dating their years at Temple by faculty epoch. Are they Weeksian? Ulmerian? Davatzian?

I thank our alumni and friends whose financial contributions have contributed to the unprecedented growth and success of the department. Be sure to read the next EES newsletter to find out what the reviewers have to say about today’s program and their suggestions for the direction we should take during the next 10 years.

Jonathan Nyquist
Professor and Chair

NSF GEOPATH grant enhances career preparation of urban geoscience students

The EES Department has received a three-year, $359,000 grant from the National Science Foundation’s GEOPATH program to enhance recruiting of undergraduate geology and environmental science majors and to enhance their career development. The goal is to entice students within EES and the College of Science and Technology, as well as students from across Temple University, to pursue urban geoscience.

Three EES faculty members—Chair and Professor Jonathan Nyquist, Associate Professor Alix Davatzes and Professor Laura Toran—teamed up with Carol Brandt, associate professor in the College of Education, on the successful grant proposal. One of NSF’s priorities is increasing student interest in pursuing STEM careers, with the GEOPATH program focusing on enhancing student engagement in the geosciences.

“We want students to realize that geology isn’t just about mapping mountains out West,” says Toran. “There are a lot of local problems that impact where students live, such as protecting impaired local streams, working on chemical hazards found in urban soils and understanding coastal hazards caused by storms.”

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Support EES: You can contribute to the continued success of the College of Science and Technology and the Department of Earth & Environmental Science by supporting the Gene C. Ulmer Undergraduate Support Fund, which helps EES students participate in a summer field camp experience. Make your gift at giving.temple.edu/givetocst
Post-docs bolstering EES research efforts

Thanks to newly acquired research funding from PennDOT, the William Penn Foundation and Temple University start-up funds awarded to Assistant Professor Sujith Ravi, for the first time ever EES has post-doctoral students engaged in departmental research. The three post-docs include:

Howell Gonzales earned his BS in chemical engineering at the University of the Philippines at Los Baños in 2001. He finished his MS (2010) and PhD (2015) degrees, which focused on air quality, at Kansas State University’s Department of Biological and Agricultural Engineering. Gonzalez’s research interests are in the areas of aeolian transport, aerosol particulate matter characterization and computational fluid dynamics (CFD) simulation of sediment transport through sparse vegetation and vegetative barriers. He currently is involved in several projects with Ravi, including evaluating the environmental impacts (emissions, hydrological processes) of large-scale biochar application (e.g. for carbon sequestration) and the application of rare earth oxides as tracers for post-fire aeolian transport.

Sarah Ledford joined EES as a post-doc in March 2016 after completing her PhD at Syracuse University. Working with Professor Laura Toran, she is looking at nutrient contamination in the Wissahickon Creek watershed. They are using high temporal nutrient sensors, combined with logging physical parameters, including temperature, stream height and specific conductivity, as well as taking seasonal longitudinal water quality samples, to evaluate the potential for stream–water quality improvement through stream restoration and stormwater management. They are also evaluating the impact of wastewater treatment plant discharges on nutrient cycling in urban streams. In addition, Ledford will also be working with Chelsea Kanaley on her master’s research regarding sediment dynamics in the Wissahickon Creek.

Rob Rossi received his BS in civil and environmental engineering from Pennsylvania State University in 2009 and his PhD from the Department of Geology and Environmental Science at the University of Pittsburgh in 2016. His research focused on urban biogeochemistry and how the unique hydrology of urban areas affects major and trace metal dynamics. In 2015, during research for his dissertation, he was awarded the Andrew Mellon Predoctoral Fellowship. Rossi joined EES this March as a post-doc, working with Toran on a PennDOT-funded project, he is evaluating stormwater infrastructures along the I-95 corridor in Philadelphia.

Dukes earns prestigious NSF summer fellowship

Last summer, David Dukes, BS ’15, MS ’17 was awarded a $4,000 Graduate Student Summer Fellowship from the National Science Foundation-funded Long-Term Ecological Research (LTER) program. Dukes conducted his research, “Quantifying Post-Fire Aeolian Sediment Transport Using Rare Earth Element Tracers,” at the Sevilleta Field Station in central New Mexico, which is operated by the University of New Mexico in collaboration with the U.S. Fish and Wildlife Service’s Sevilleta National Wildlife Refuge. Duke’s advisor was Assistant Professor Sujith Ravi.

NSF GEOPATH grant

The grant also includes a one-on-one math mentoring program in which EES student volunteers help students through the required math sequence, an enhanced curriculum geared toward providing job skills; an internship program that recently linked up its first cohort of students with participating employers; and, pending the approval of the Temple University Board of Trustees, an environmental professional certificate.

Brandt, from the College of Education, will periodically assess the effectiveness of the program, including student recruitment and retention.
Assessing effectiveness of new I-95 green stormwater measures

PennDOT is rebuilding the I-95 corridor through Philadelphia and professors Laura Toran and Jonathan Nyquist are part of the PennDOT-funded research team that is evaluating the effectiveness of green stormwater infrastructures that are part of the project. The interdisciplinary team also includes faculty from Temple’s departments of Landscape Horticulture and of Civil and Environmental Engineering, as well as from Villanova University.

The team has set up extensive monitoring to evaluate water budgets, road runoff chemistry, infiltration patterns and plant health, and plan to use their results to improve future designs. Students will have an opportunity to learn about new monitoring techniques to assess green infrastructure.

“It’s likely to be a long-term project that involves lots of miles and dollars, and we’re essentially creating a living urban laboratory,” says Toran. “PennDOT wants to put in storm water controls that are more effective, so we are assessing what’s already been built, such as around the Girard Avenue interchange, and using what we learn to help improve PennDOT’s future designs.”

Alix Davatzes probing billions-years-old asteroid strikes

Between 3.5 billion and 2.4 billion years ago, more than 10 large asteroids pulverized the Earth’s crust and mantle as much as 16 kilometers deep. The impacts vaporized megatons of rock into the atmosphere, which then crystallized into rounded, hail-sized particles called spherules that coated the entire planet.

With a five-year, $445,000 NSF CAREER research grant, Associate Professor Alix Davatzes has been studying the environmental impacts of the asteroid strikes during the early evolution of life on earth. She is doing so in the only known areas of the world were these deposits can be found—in near-desert environments in Western Australia and near the South Africa-Swaziland border east of Johannesburg which, at the time, were submerged under ocean waters.

“Spherules that coated the entire planet. The impacts vaporized megatons of rock into the atmosphere, which then crystallized into rounded, hail-sized particles called spherules that coated the entire planet.”

“Remediation of PAH-contaminated soil is expensive and time consuming. So researchers want to develop an environmentally friendly, cost-effective, in-situ remediation method that could potentially replace current, multi-million dollar clean-up practices.

Funded by the Temple Office of Sustainability, Assistant Professor Bojeong Kim and graduate student Alexis Nawotka have proposed a new, in-situ nano-remediation technique. They are currently investigating the use of lipid molecules as a form of small unilamellar vesicles that could readily extract hazardous PAHs from various soil matrices.

Ravi provides new insights into the origin of Namib Desert fairy circles

The origin of the millions of so-called fairy circles—bare patches of soil ringed by tall grasses that range from 12 feet to more than 100 feet in diameter—in the eastern interior of the coastal Namib Desert in southern Africa have long been debated by researchers.

In a paper featured on the cover of the February 2017 issue of the Journal of Geophysical Research: Biogeosciences, a journal of the American Geophysical Union, Temple researchers Assistant Professor Sujith Ravi and Associate Professor Ilya Buynevich, as well as colleagues from Indiana and Purdue universities and the National Museum of Namibia, offer support for the self-organization theory. This attributes the circles to plant competition for scarce water. It’s believed that the bare patches percolate more rainfall and act as water reservoirs, which the grass along the edges of the circle can access.

Says Ravi, lead author of the study that was also featured as an EOS.org research spotlight, “This study is a major contribution to resolving the fairy circles enigma.”
ALUMNI NEWS

Andrew Bentley, MS '13, who conducted georadar research in the world’s largest gypsum desert at the White Sands National Monument in New Mexico will be receiving his PhD in geoscience education from Western Michigan University and has accepted a post-doctoral position at the University of Northern Colorado.

Christopher Conwell, BS '16, received his third outstanding poster award at the 2016 regional Geological Society of America conference in Albany, New York.

Roselyne Laboso, MS '16, studied geothermal systems as a fellow at the Lawrence Berkeley National Lab last year. She presented a paper on her research at the Stanford Geothermal Workshop.

Brian Hughes, MS '11, who earned a law degree from the University of Tulsa College of Law in 2014, is now with the Washington, D.C. office of Pierce Atwood LLP in its energy law group.

Christopher Seminack, MS '11, graduated with a doctorate from George Mason University last year and is designing a geoscience program as an assistant professor of geology at the University of North Georgia.

Logan Wiest, MS '14, is completing his PhD at Baylor University and had an article about the mystery of massive death of Waco mammoths published in Palaios and featured in Scientific American.

Faculty and students present at AGU, GSA and LPSC conferences

Throughout the past year EES faculty and students took part in national and regional conferences, including those hosted by the American Geophysical Union (AGU), Geological Society of America (GSA), and Lunar and Planetary Science Conference (LPSC). At the March 2017 regional GSA section meeting in Pittsburgh, 10 presentations, including eight posters and two talks, were given by EES undergraduate students.