

A woman with dark hair tied back, wearing a brown floral long-sleeved shirt, a red vest, a green knitted scarf, and blue gloves, is leaning over a table in a workshop. She is examining a large, dark, irregular piece of whale blubber. The workshop is filled with various materials, including cardboard boxes and plastic bags. The background is slightly blurred, showing more of the workshop environment.

THE BRIDGE

CAREFUL COEXISTENCE

CEE doctoral student Molly Gear studies whale blubber to determine how marine mammals may be impacted by the spinning blades of tidal turbines.

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SPRING 2018

CIVIL & ENVIRONMENTAL ENGINEERING
UNIVERSITY of WASHINGTON

A woman is sitting on the floor, surrounded by large bowls filled with colorful beads in shades of pink, red, yellow, and green. She is wearing a purple headscarf and a patterned top, and is focused on her work. The scene is brightly lit, and the beads are vibrant.

India study
abroad program
empowers
students to
tackle grand
challenges

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MESSAGE FROM THE CHAIR

With the end of the academic year in sight, I have been reflecting on what I learned during my first year as department chair. What stands out is the incredible breadth of research, education and service activities undertaken by CEE faculty, students and staff. I am amazed at the impact, both local and global, that our department has on the world.

To meet growing demand, the diversity of CEE program offerings continues to grow as does the size of our student body. Last fall, we launched a second undergraduate program, the Bachelor of Science in Environmental Engineering degree, which will enable us to significantly expand our undergraduate class size in coming years. Our graduate degree programs also continue to expand with the upcoming launch this fall of a fourth online graduate degree program, a Master's in Energy Infrastructure. Our Ph.D. program is thriving, with 100 students studying a variety of topics from air quality near airports to the use of climate and weather modeling to improve hydropower production. In recognition of the quality of our graduate programs, both the civil engineering and environmental engineering programs were ranked 17th by *U.S. News and World Report*.

Beyond a wealth of degree options, students supplement their studies with educational experiences around the world. UW CEE is unique in the number of faculty-led study abroad programs offered. This edition of *The Bridge* highlights a new offering, the Grand Challenges Impact Lab: India, developed by professor Julian Marshall. Our long-standing study abroad programs offer students the opportunity to travel to Jordan to learn about water quality or to visit Rome to learn about civil infrastructure during the past 3,000 years. In addition, the Valle Scholarship and Scandinavian Exchange Program promotes the exchange of graduate students between UW and schools in Nordic countries, and through the UW Chapter of Engineers Without Borders students are working to bring running water to a small Nicaraguan village.



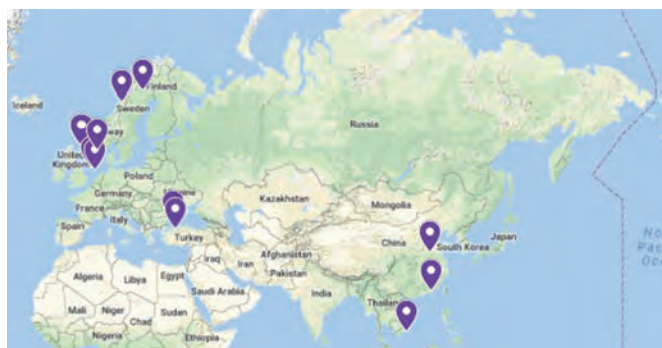
Laura Lowes, Chair & William M. and Marilyn M. Conner Professor

To showcase our global reach, we recently launched the Student Global Research Map on the CEE Web site. I encourage you to visit the map to learn about student projects around the world, such as Ph.D. student Maddie Smith, who traveled to both polar seas to collect data on the role of waves in sea ice formation, which will be used to better understand the distribution of heat on our warming planet.

In closing, I offer my congratulations to this year's graduates and wish them much luck in their future endeavors.

Laura Lowes

Chair & William M. and Marilyn M. Conner Professor



Student Global Research Map

The Arctic Ocean, Jordan and Switzerland are just a few locations where UW CEE graduate students conduct research. Learn about global research projects currently underway with an interactive map available at www.ce.washington.edu/research/global.

ASSOCIATE CHAIR MICHAEL BRETT

focuses on the student experience

It all comes down to experience. The department's new associate chair, Michael Brett, plans to draw on 21 years of academic experience to ensure that students have an exceptional student experience.

As the department's new associate chair for educational affairs, Brett is assisting CEE department chair Laura Lowes with various administrative projects pertaining to enhancing the undergraduate and graduate programs.

"My goal is to give both undergraduates and graduate students the best educational experience we can," Brett said. "I want them to feel like we enable them to achieve their personal and professional goals."

To help inform future enhancements, Brett is going straight to the source for input: current students. He is coordinating a focus group comprised of professional master's program students, who he hopes will share their impressions of the program and offer ideas for improvement.

"The students are close to it; they know why they came here and have valuable perspectives," Brett said.

Facilitating communication across all student groups is important, said Brett, who is also exploring ways to integrate freshmen and sophomore students into the department at an earlier point to "learn what this place is about, what the CEE community is about."

"The educational culture in CEE is very collaborative, the students work in teams and help each other on assignments. This is an ideal atmosphere for many students," Brett said.

Overall, Brett's focus is on providing a quality student experience. In addition to enhancing courses and communications, he hopes to educate students on the topic of engineering ethics and is considering ways to bring in more perspectives from professional engineers who can talk about day-to-day challenges in the field.



Michael Brett

Staff



MARIKO NAVIN
COE Professional Staff
Award

In recognition of her commitment to students, lead academic adviser Mariko Navin was honored with the 2018 UW College of Engineering Professional Staff Award. In her current role, which she has held for 12 years, Mariko advises more than 360 undergraduate students in the department's two bachelor's degree programs. Dedicated to building relationships with individual students, she knows many by name, which enables her to reach out to troubled students or connect talented students with challenging projects. Mariko also helped establish the new Bachelor of Science in Environmental Engineering degree program, founded the annual CEE Career Fair and has worked to enhance the CEE department graduation ceremony.



TSEGE GEBREIOGRIS
certificate of appreciation

Custodial staff Tsege Gebreiogris was recognized for her dedication to the department at a surprise event in December 2017. Surrounded by department staff and faculty, she was presented with a certificate of appreciation plaque, letters and a substantial cash gift contributed by CEE faculty and staff. The text on the plaque read "In recognition of your dedicated service, outstanding work, and the personal warmth and care that you extend on a daily basis to all those in More Hall. The staff, faculty, and students are very fortunate and appreciative." According to lead academic adviser Mariko Navin, who organized the event, "Tsege was so surprised, happy and grateful."

AWARDS & ACCOLADES

Students



Oriana Chegwidzen, Ph.D. student and research scientist, received the Bonneville Power Administration's 2017 Administrator's Excellence Awards Exceptional Public Service Award, together with associate professor Bart Nijssen, for developing climate change datasets and models for long-range hydropower planning in the Columbia Basin.



Haena Kim, Ph.D. student, received the Senator Scott White Memorial Scholarship, awarded by the Women's Transportation Seminar. To improve the final 50 feet of freight delivery systems, Kim is working with the city of Seattle, SCTL Center and Urban Freight Lab.



Yifan Cheng, Ph.D. student, received an Outstanding Student Paper Award at the American Geophysical Union Fall Meeting in December 2017 for his research on how climate change impacts stream temperatures for large river systems that are regulated by reservoirs.



Elyse O'Callaghan Lewis, Ph.D. student, is one of 20 transportation graduate students invited to the 2018 Eno Future Leaders Development Conference in Washington D.C., where attendees learn about national transportation policies. To cover conference expenses, Lewis received support from PacTrans.



Hannah Hampson, undergraduate student, received a Mary Gates Research Scholarship, which supports her research to improve hydrologic forecasting. By examining the variation in snow levels on opposing sides of the Olympic Mountain range, she is exploring discrepancies in melting levels and atmospheric causes.



Victoria Ly, Ph.D. student, is the recipient of a National Science Foundation Graduate Research Fellowship, which supports her research to develop remote sensing technology, modeling and advanced computation methods to address water management and planning issues, particularly in under-resourced areas and communities.



Alessandra Hossley, master's student, was awarded the ADSC International Association of Foundation Drilling West Coast Chapter Scholarship, established to further industry advancement through education and research. After completing the professional track master's program this June, Hossley will work for Hart Crowser.



Jose Machado, Ph.D. student, is the recipient of Concord Engineering's Jason Holdridge Memorial Scholarship. Machado is working on a collaborative research project with the city of Seattle, SCTL Center and Urban Freight Lab to improve the final 50 feet of freight delivery systems.

Thirty students receive WAPA scholarships

Thirty scholarships equals thirty smiles. To support high-achieving students, the Washington Asphalt Pavement Association (WAPA) granted scholarships to 30 UW CEE undergraduate and graduate students at a ceremony in March 2017, presided by WAPA executive director Dave Gent, BSCE '81. A total of 28 undergraduate students received \$1,000 each and two graduate students received \$2,000 each.

Awardees

Congratulations to the following recipients:

Julian Yamaura,
graduate student
James Feracor,
graduate student
Donovan Cordova, senior
Garret G. San Luis, senior
Kara Kronbauer, senior

Katarina Kubiniec, senior
James Roney, senior
Philip Yu, senior
Kyleah Hess, senior
Amy Moore, senior
Michelle Horio, senior
Rowan Hobson, senior





Erika Miller, Ph.D. student, received the Best Doctoral Student Research in Transportation Safety Award at the Transportation Research Board Annual Meeting and the Best Student Paper Award from the Human Factors and Ergonomics Society Surface Transportation Technical Group. Her research explores unintended safety consequences of semi-autonomous and autonomous vehicle systems.



Ben Therrien, undergraduate student, received a Mary Gates Research Scholarship, which supports his work on the Mount Everest Biogas Project. To inform the use of anaerobic digester technology to convert waste into a renewable natural gas, Therrien is analyzing systems used in Nepal.



Justin Pflug, Ph.D. student, is the recipient of an Avalanche Society Scholarship, which funded his travel to Switzerland where he worked with avalanche experts gathering data on avalanche-snow distribution. The data will be used to better model snow stability and points of large-scale wet avalanches.



Dylan Reynolds, undergraduate student, received a Mary Gates Research Scholarship, which supports his research in the Mountain Hydrology Research Lab. To better quantify summer water supply, he measures the Washington Cascades Range snowpack to explore snow density changes throughout the winter.



Andy Sen, Ph.D. student, received the O. H. Ammann Research Fellowship in Structural Engineering, which supports his research on the seismic performance and rehabilitation of vulnerable concentrically braced frames. He is developing advanced computational methods to investigate the seismic response of braced-frame buildings.



Beavers Charitable Trust Scholarships

CEE seniors Amy Moore and Sidney Hutchison were awarded Beavers Charitable Trust Scholarships for the 2017-18 academic year. The \$5,000 scholarships support students who plan to pursue careers in the construction engineering field. Spearheaded by alumnus Tom Draeger (BSCE '68), the scholarships were established by the Beavers Charitable Trust in 2015.

Tim Prusa, *senior*
Martha Quigg, *senior*
Joseph Lasensky, *senior*
Daniel Bi, *senior*
Tony Hua, *senior*
Marina Savenkova, *senior*
Bethsaid Garcia-Real, *senior*
Elizabeth Guilford, *senior*
Jenna Louie, *junior*

Aleya Abeshima, *junior*
Jared McMeen, *junior*
Amber Hall, *junior*
Christopher Adams, *junior*
Mary Koutrelakos, *junior*
Casiano Atienza III, *junior*
Hannah Peterson, *junior*
Evan Ponto, *junior*
Ben Long, *junior*



Donors

Thank you to the following current and past members of the Washington Asphalt Pavement Association for generously funding the scholarships:

Wesley C. & Jean C. Bogart
Ace Paving Company, Inc.
St Paul/Seaboard
Sturdy Weld Equipment
& Design, Inc.
Wenatchee Sand &
Gravel Co.
Wilder Construction Co.

Woodworth & Company, Inc.
Albert & Pat DeAtley/
Superior Asphalt
Brown & Brown of Washington
/Superior Asphalt
A.E. DeAtley/Superior Asphalt



Up next: nationals

Both the Concrete Canoe and Steel Bridge teams advance to nationals

It's good news times two. After placing first and second at their respective regional competitions, both the Concrete Canoe and Steel Bridge teams will represent UW at nationals.



The Concrete Canoe Team won the Concrete Canoe Pacific Northwest Student Conference at the Oregon Institute of Technology in April. The team will compete against 24 other teams at the National Concrete Canoe Competition at San Diego State University in June.



The Steel Bridge Team took second place overall at the 2018 PNW ASCE Student Conference at the Oregon Institute of Technology in April. The national competition was at the University of Illinois, Urbana-Champaign in May.

Faculty



MARC EBERHARD
PSEC Academic Engineer
of the Year

Professor Marc Eberhard received the 2018 Academic Engineer of the Year Award from the Puget Sound Engineering Council. A structural engineering educator and researcher, Eberhard is honored for his dedication to students and innovative research on the performance of reinforced and prestressed concrete buildings and bridges subjected to seismic forces. Together with colleagues, Eberhard developed a precast system for rapid bridge construction that performs well during earthquakes; created engineering tools to better predict damage to reinforced concrete columns; and modified seismic design methodologies to reflect the unique motions expected in the Puget Sound Region.



ANNE GOODCHILD
Transportation Person
of the Year

Professor Anne Goodchild was named the 2017 Person of the Year by The Transportation Club of Seattle. The annual award recognizes "an individual who has made extraordinary efforts, impact and contributions to the local transportation field and community." Goodchild is the founding director of the Supply Chain Transportation and Logistics (SCTL) Center, the first of its kind in the Pacific Northwest. Under Goodchild's leadership, the SCTL Center launched the Urban Freight Lab, which addresses urban delivery issues through a strategic partnership of private companies and public-sector agencies that collaborate with the City of Seattle.



STEVE KRAMER
ASCE H. Bolton
Seed Medal

Professor Steve Kramer received the 2018 H. Bolton Seed Medal, bestowed by the American Society of Civil Engineers in recognition of outstanding career accomplishments in geotechnical engineering. The award recognizes Kramer's contributions to geotechnical earthquake engineering, particularly his research advancements in the areas of liquefaction, seismic slope stability and dynamic soil behavior. Kramer is the author of *Geotechnical Earthquake Engineering*, the first book written on the subject, which is widely recognized as elevating the practice of earthquake engineering around the world. Also notable are Kramer's leadership with the Pacific Earthquake Engineering Research Center and the Next Generation Liquefaction study.



DAVID SHEAN
UW Innovation Award

To better understand regional climate change and water resources, a team of researchers led by CEE assistant professor David Shean plans to build a digital glacier time machine. The project is one of three across campus to receive a 2018 UW Innovation Award, which funds innovative ideas that have the potential to "break open new territory in a field." The idea surfaced as a new approach to document and understand the effects of climate change in the Pacific Northwest. Using historical data sets, together with field measurements, the researchers will develop automated, open-sourced, cloud-based software to generate detailed 3-D models of glacier surfaces.



JULIAN MARSHALL
ES&T Best Environmental
Technology Paper

In recognition of novel research that utilized Google Street View Cars to gather air pollution data and create the largest dataset of its kind, a team of researchers including professor Julian Marshall received the 2017 Best Environmental Technology Paper from the journal *Environmental Science & Technology*. As conventional fixed-site air pollution monitoring methods fail to capture exposures over short distances, the researchers obtained more precise measurements by equipping Google Street View Cars with air pollution measurement tools. Data collected from every street in an 18-mile area of Oakland, Calif. was used to develop the largest urban air quality dataset of its type.



Careful Coexistence

CEE Ph.D. student studies whales and renewable energy, recognized by *Forbes*

*Molly Gear stands on the dock in front of Friday Harbor Labs, where she tests tissue samples of various marine mammals.
Photo credit: Mark Stone/ University of Washington*

The majority of people don't spend much time thinking about blubber. But for Ph.D. student Molly Gear, it's the primary focus of her research.

"I set out to answer an environmental question and ended up fascinated by how blubber works," Gear said.

Stretching whale blubber to determine how pliable it is enables Gear to assess how marine mammals may be impacted by the spinning blades of tidal turbines, an emerging form of renewable energy. Tidal turbines, which look like underwater windmills, are not widely used in the United States, although they are more common in Europe. The development and commercialization of tidal turbines has been slowed by a number of factors, most notably the potential to harm marine mammals.

In recognition of her work in the energy field, Gear, 28, was named to *Forbes* magazine's list of the top 30 people under the age of 30 who are working on energy initiatives with the goal of creating a more sustainable future. The magazine profiles "a group of upstarts, judged by our sources and judges, to be among the most promising individuals working across the broad field of anything even tangentially 'energy' related."

"The work I do is charismatic and marine animals are charismatic," Gear humbly said about the award.

What about the whales? A problem surfaces

While marine renewable energy is gaining interest as a way to combat climate change, the impact on marine wildlife has not been widely studied. In the Seattle area, environmental conservation groups and regulatory agencies began voicing concerns around 2010 that tidal turbines may harm killer whales in Puget Sound. At the time, two turbines were proposed on the east side of Admiralty Inlet, situated between the Olympic Peninsula and Whidbey Island.

Gear began addressing this concern while working as a research assistant for Pacific Northwest National Laboratory after earning her bachelor's degree at Dartmouth College. She spent three years investigating the potential environmental impacts of installing various ocean energy devices. When she decided to pursue a Ph.D., Gear wanted to continue investigating the topic and obtained funding through a National Science Foundation Graduate Research Fellowship.

"Molly is among the most motivated and curious students I have come across at UW," said assistant professor Michael Motley, Gear's faculty adviser. "She came in on day one with a research direction, and because of her graduate research fellowship she has had the freedom to develop and lead a distinct research path that is uniquely her own."

Blubber and blades: Assessing risk

While tidal turbines may have a number of negative impacts on marine mammals, including increased noise, the most commonly discussed issue is blade strike. To determine the potential damage that tidal turbines may cause to marine mammals, Gear investigates two factors: the biomechanical properties of marine mammal skin and blubber and the probability that marine mammals will be in close proximity to tidal turbines.

To evaluate the biomechanical properties of marine mammals, Gear studies their skin and blubber to determine if it is resilient enough to protect them from potential blunt force trauma encountered in a tidal blade collision. Gear has found that resilience is largely determined by the layers of skin and blubber that together create a stronger material that can absorb forces without breaking.

"The multiple layers have different material properties, each with a different function, that can protect the animal better," Gear said.

After first modeling the forces that a turbine blade might have on a marine mammal, Gear tests tissue resilience using the same methods used to study the material properties of steel and concrete. The data is then combined to create a model showing potential risk.

"In the Structures Lab, people pull big things apart," Gear said. "I do this on a tiny scale machine."

Every few months, Gear travels to Friday Harbor Labs, a marine biology field station located on San Juan Island, where she spends a few days at a time testing tissue samples of various marine mammals, from killer whales to harbor porpoises to harbor seals. During the summer months, she often collects fresh tissue samples at weekly necropsies organized by researchers on the island when marine mammals wash up on the shore.

The second factor that Gear evaluates is how close marine mammals may potentially be to a tidal turbine. She models the probability of collision using a variety of existing data such as swimming speed, dive depth, water depth and blade speed.

"This approach shows that overall the likelihood of event is small," Gear said. "This has some downsides, though, in the sense that there is no behavioral component."

Coexistence conclusion

With a better understanding of the nature of marine mammal tissue, coupled with the small likelihood that they would encounter blade strikes, Gear believes that marine mammals and turbines can coexist. Modifying the technology can help counteract some risks, she said, by configuring blades that slow down when animals approach or modifying the shape of turbines so they are less likely to strike marine mammals.

"The fact that not all collisions cause damage combined with the unlikely event of a collision because the animals are smart and likely to avoid the turbines makes this a risk we can live with," Gear said.

To disseminate her findings, Gear has published two peer-reviewed papers, as well as additional conference papers and technical reports.

"Molly's work has focused on improving the understanding of how marine mammals would respond to blade strikes to better inform the marine energy community as they design various prototypes," Motley said.

Putting passion into practice

As Gear closes in on the end of her graduate studies, and prepares to graduate this summer, she is exploring career opportunities. She is open to a variety of positions, including faculty positions, post-docs and even policy fellowships in Washington D.C.

Gear aspires to continue working on marine technology, with a slightly different angle. Her "dream research" is engineering new technology in the ocean that takes advantage of existing biology and how animals interact in their environment. An example is creating shoreline protection comprised of barnacles, which naturally adhere to surfaces.

"Rather than putting something in the ocean and hoping the biology won't bother it, using what is there," Gear said. "That is the big dream. Those types of projects make me excited."

Photo below left: Comparing small sections of harbor porpoise and killer whale tissue, which have visible differences in color and composition.

Photo below right: Molly Gear utilizes her artistic side to illustrate her research.



India Impact

New India study abroad program empowers students to tackle grand challenges

Seventeen students studying abroad in India didn't waste any time before immersing themselves in the new culture. They zipped around on auto rickshaws on the first day, learning to negotiate prices with drivers who speak Kannada, the local language.

"Some of the bargaining involved a lot of confused looks and bobbling heads," said CEE senior Samantha Modabber. "But auto rickshaws were, by far, my favorite way of getting around."

The students' first day in Bangalore set the tone for the next 10 weeks. They quickly got used to getting out of their comfort zones to problem-solve both everyday hurdles and big issues facing humanity, called grand challenges.

"Students hunger for that," said professor Julian Marshall, who facilitated the new Grand Challenges Impact Lab (GCIL): India, which launched in winter quarter. "They want to go out and change the world."

Different, but normal

Cows freely roaming the streets, spicy food for breakfast, traffic rules that are interpreted as suggestions, brightly painted buildings and cars honking constantly were just a few differences that greeted GCIL students in Bangalore.

"A lot of the lifestyle is going with the flow. The better you are able to do that, the easier it is to adjust," Modabber said.

An affluent city in a low-income country, Bangalore was selected to headquarter the GCIL program because organizations there are already addressing big challenges. A partner organization in Bangalore, called ILK, helped recruit local organizations and deliver the GCIL program.

"Whatever grand challenge you may think about, it is likely to be present in Bangalore, with people there working on it already," Marshall said. "With so many excellent organizations trying innovative approaches, Bangalore is a great place to learn."

Photo: Students visited the K.R. Market in Bangalore, the oldest and busiest market place in the city. Photo credit: Tyler Ung

Problem proficiency

During the GCIL program, students learned to become problem-solvers by practicing design thinking, an iterative process that entails listening to people articulate challenges, defining problems, proposing solutions, creating prototypes and testing designs.

To get used to asking uncomfortable questions, GCIL students visited a slum with the organization Sukhibhava, which brings menstrual health education to communities. Assisted by a translator, the students were asked to approach women in the community and ask where they obtain feminine hygiene products. While some women walked away, many were happy to talk.

The students also took field trips to learn about pressing issues in society. They toured an organic farm, Annadana Farms, which empowers farmers by providing training and land to grow food. Accompanied by the organization Hasiru Dala, which advocates for sustainable livelihoods for waste workers, the students visited a dry-waste collection center where some of the workers hadn't been paid in more than six months.

"If you want to solve problems in India, you can't do it from a classroom in Seattle. You also can't do it from an office in Bangalore," Marshall said. "You have to go out on the street and talk to people and ask what they think."

Up for a challenge

Beginning in week four, the students were ready to get to work. Divided into four teams, they partnered with local organizations on specific problems for the remainder of the course. After breakfast each morning, the students departed for their job sites.

Each team addressed a different problem: housing construction in slums, water quality and quantity, financial literacy for migrant communities, and secondary education in rural areas. Comprised of students from various disciplines, the teams took advantage of collective strengths and skills.

"A grand challenge is something that cannot be solved by just one discipline," said CEE senior Mark Galiza. "It involves the collaboration of many disciplines and backgrounds."

To address water quality and quantity, Galiza's team investigated the growing reliance of households on borewells, which are narrow wells drilled into the ground. As borewells often run dry from overconsumption, the team identified a lack of knowledge about water quantity and quality.

Galiza's team created a borewell monitoring service called WELLNESS, which collects water quality and quantity data via a smartphone application and automatically uploads it to a centralized database. The team's approach also provides data analysis and easy access to online information, so residents can monitor their water source.

By the end of 10 weeks, each team developed a plausible solution. To share their work, each team gave a public presentation and created a two-minute video.



Top: During a visit to learn about a school's water system, CEE senior Mark Galiza meets children.

Above: GCIL students celebrate the Holi Festival, when people throw colored powder on one another to celebrate the victory of good over evil and the arrival of spring.

Ready to repeat

When asked if the program should be offered again, the students were unanimous: "They said yes, yes, yes," Marshall said. A few modifications are already underway in preparation for next year's program. In addition to increasing the class size from 17 to 25, more professors will rotate through the 10-week course, each spending a few weeks teaching and advising students.

This program is truly a once in a lifetime experience. It pushes you to think big," Galiza said. "It's not some sort of simulation; the work you do within the 10 weeks can truly impact beneficiaries in need."

View videos

Check out the following videos:

- An overview of GCIL: courses.washington.edu/gcil.
- Two-minute videos of each team's final project: uwgcil.wixsite.com/uwgcil/projects.





APPLICATIONS ACCEPTED

New online energy infrastructure master's program starts in autumn

Here's something to get energized about: applications are currently being accepted for the new online Master of Science in Civil Engineering: Energy Infrastructure program through July 1, 2018.

Launching in autumn 2018, the program will prepare students to plan, design, construct and manage energy related infrastructure projects. The new program responds to current changes in the country's energy infrastructure, which is quickly moving from traditional fossil fuel systems to renewable energy sources. The changes are driven by both climate change concerns and technological advancements.

The online master's degree program allows students to pursue a specialized focus while setting their own schedule, enabling them to participate from any location and work full-time. Students will be able to complete the program in 2-3 years.

Coursework is similar to in-person programs and students communicate with classmates and instructors online. Courses are taught by UW CEE faculty in the Construction, Energy and Sustainable Infrastructure group, as well as experts in the field.

Learn more at www.energy-infrastructure.uw.edu.

Graduate programs **RANKED #17**

As it turns out, UW CEE's graduate programs are not only good- they're equally good! Both the civil engineering and environmental engineering programs, which are ranked separately, received #17 rankings by *U.S. News & World Report* for the best graduate programs in 2019.

Congratulations to UW CEE's faculty, students and staff who make the department a place of excellence!



EVANS LECTURE 2018:

Enjoy the video



There is more than one way to estimate global water resources. But which method is best? Dr. Bridget Scanlon, the 2018 Evans Endowed Lecture speaker, shed light on this topic during a presentation titled "Global Water Resource Assessments: Models vs. Satellites" on May 3. Scanlon discussed the reliability of models and satellites to evaluate global water resources, as each method offers differing data, and highlighted potential areas of future model development. Elected a member of the National Academy of Engineering in 2016, Scanlon leads the Sustainable Water Resources Program at The University of Texas at Austin.

Enjoy the video at www.ce.washington.edu/news/video.



MAKING CONNECTIONS

Record participation at CEE Career Fair

More employers means even more connections were made at the 12th annual UW CEE Career Fair in January 2018. The career fair was the largest yet, with 74 companies participating from across the United States and Canada – a 48% increase from last year.

A total of 350 students attended the career fair, founded in 2007 to connect students with employers who are seeking internships and full-time positions. Industry focuses range from general civil engineering to specialty areas such as construction, transportation, geotechnical, structural, water resources/ hydrology/fluid mechanics and environmental engineering.

Thank you to the many companies and organizations that continue to participate and support the CEE Career Fair.

Perfect Attendance

The following companies have attended the majority of CEE career fairs since 2007:

BergerABAM	Perteet, Inc.
Gray & Osborne, Inc.	Reid Middleton, Inc.
Hart Crowser, Inc.	US NAVY
Kiewit	WSP (formerly Parsons Brinckerhoff)
KPFF Consulting Engineers	
Magnusson Klemencic Associates	

Stellar Support

The following companies have attended at least half of all CEE career fairs since 2007:

DCI Engineers	Murraysmith, Inc. (Murray, Smith & Associates, Inc.)
Degenkolb Engineers	PACE Engineers, Inc.
Fehr & Peers Transportation Consultants	Puget Sound Energy
Harriott Smith Valentine Engineers Inc	Tacoma Water
HDR Engineering, Inc.	Transpo Group (formerly Transportation Solutions)
HNTB Corporation	US Army Corps of Engineers Seattle District
Manson Construction Co.	

Graduation keynote speaker: ALUMNUS LEE MARSH

UW CEE welcomed alumnus Lee Marsh (Ph.D. '91) as the keynote speaker at the department's graduation celebration in June 2018. Marsh is the president/CEO of BergerABAM, a 250-person civil/structural infrastructure consulting firm with offices in the Seattle, Portland, San Diego and Houston areas.

During his tenure at BergerABAM, Marsh has served as the chief seismic specialist for building, bridge, transit, marine and special-structure projects. He has engineered highly specialized material-handling cranes used by the U.S. Army Corps of Engineers for major infrastructure projects and for nuclear-waste storage, including the doomed reactor in Chernobyl. Marsh also guided the design development of major U.S. Navy projects at Bremerton and Bangor, Wash., including one of the largest building-on-a-pier facilities anywhere in the world. Prior to joining the firm in 1994, Marsh was a structural engineer at the Oak Ridge National Laboratory and served on the faculty at Washington State University.

A developer of bridge seismic design procedures since his days as a UW doctoral candidate, Marsh assisted the AASHTO seismic technical committee with developing Guide Specifications for LRFD Seismic Design of Bridges. He also serves on the Transportation Research Board's seismic, geoseismic and accelerated bridge construction committees. He has authored various documents on performance-based seismic design and accelerated bridge construction, several in collaboration with UW CEE faculty and researchers.



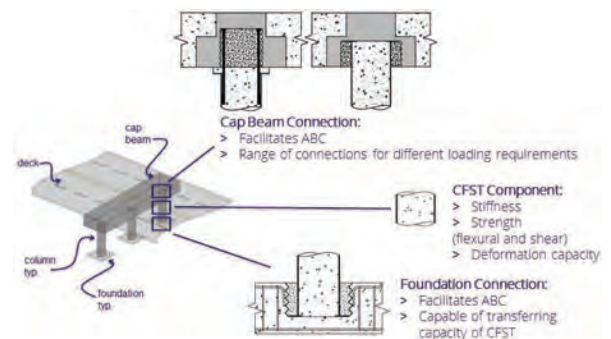


Working to reduce failed deliveries, **IMPROVE SEATTLE CONGESTION**

Getting packages in the hands of online shoppers while alleviating traffic congestion is the goal of a team of UW CEE transportation researchers who are on the road to making this a reality. To address growing urban congestion in Seattle, which stems from a rapidly growing city coupled with an increase in online shoppers, researchers in UW CEE's Urban Freight Lab, which is part of the Supply Chain Transportation and Logistics Center, joined forces with Seattle Department of Transportation (SDOT). The researchers are addressing a challenge called the "Final 50 Feet," which is the complicated last leg of urban deliveries, when a delivery driver must locate both parking and customers. The researchers found that 87 percent of buildings in downtown Seattle do not have loading bays or docks and delivery drivers spend up to 73 percent of delivery time on tasks such as clearing security, riding elevators and looking for tenants. In April, the UW researchers and SDOT tested improvement strategies at Seattle Municipal Tower, where they piloted a smart locker system for delivery drivers to securely leave packages for tenants to collect at a convenient time.

An innovative approach to **ACCELERATED BRIDGE CONSTRUCTION**

Stronger and faster are two words that describe a new type of bridge design that professor Dawn Lehman and professor emeritus Charles Roeder are working to bring into practice. The innovative design entails a new concrete-filled steel tube (CFST) frame system, which is comprised of hollow steel filled with concrete. By taking advantage of both concrete and steel, CFST systems offer increased strength and stiffness when compared to traditional reinforced concrete or structural steel systems. Another advantage is that CFSTs allow for accelerated bridge construction, as the steel tubes serve as formwork and reinforcement to the concrete fill, negating the need for reinforcing cages, shoring and temporary formwork. The new CFST bridge design concept was recently included in updated bridge design manuals by the American Association of State Highway Officials and state departments of transportation.



Interdisciplinary team **IMPROVES FLOATING COMMUNITY IN THE AMAZON**

Located on the banks of Iquitos, the capital of the Peruvian Amazon, a small informal settlement called Claverito floats for half the year during the wet season. As the community does not receive any government services, a team of interdisciplinary researchers including CEE assistant professor Becca Neumann are working to improve the health and quality of life of residents by implementing innovative interventions that improve the built and natural environments. Neumann's research focuses on measuring E.coli levels in the water and exploring ways to improve the water quality, which community members use to bathe and swim. The interdisciplinary team includes faculty and students from UW's global health, dentistry, nursing and landscape architecture programs who are evaluating the health of residents and determining how installation of a walkway and floating gardens in the community impact resident health.



EARTHSHAKING INFORMATION: researchers gather perishable data in Mexico

Although rubble and cracks in buildings may not have tangible value, they provide priceless information to the research community. By analyzing damaged infrastructure in the wake of natural disasters, researchers gain insight that helps inform the development of more resilient communities. In the aftermath of the 7.1 magnitude Central Mexico earthquake in September 2017, which killed more than 350 people and collapsed numerous buildings, a reconnaissance team including professor Pedro Arduino and alumnus Jake Dafni (Ph.D. '17), who is the site operations manager for the CEE department's natural hazards research center, traveled to Mexico to collect perishable data. Unlike other forms of data, perishable data must be gathered quickly before it is no longer useful. By evaluating which structures survived and which ones suffered damage, the researchers hope to improve construction methods and engineering designs.



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Hands-on learning at Discovery Days



The excitement of engineering came to life for many youth during Discovery Days. Students and faculty from all UW engineering departments shared their work with more than 11,000 4th through 8th grade students during the two-day annual event on April 19-20. UW Civil & Environmental Engineering students coordinated 21 exhibits with hands-on activities such as testing structures on a shake table and investigating the interactions between fresh and salt water.