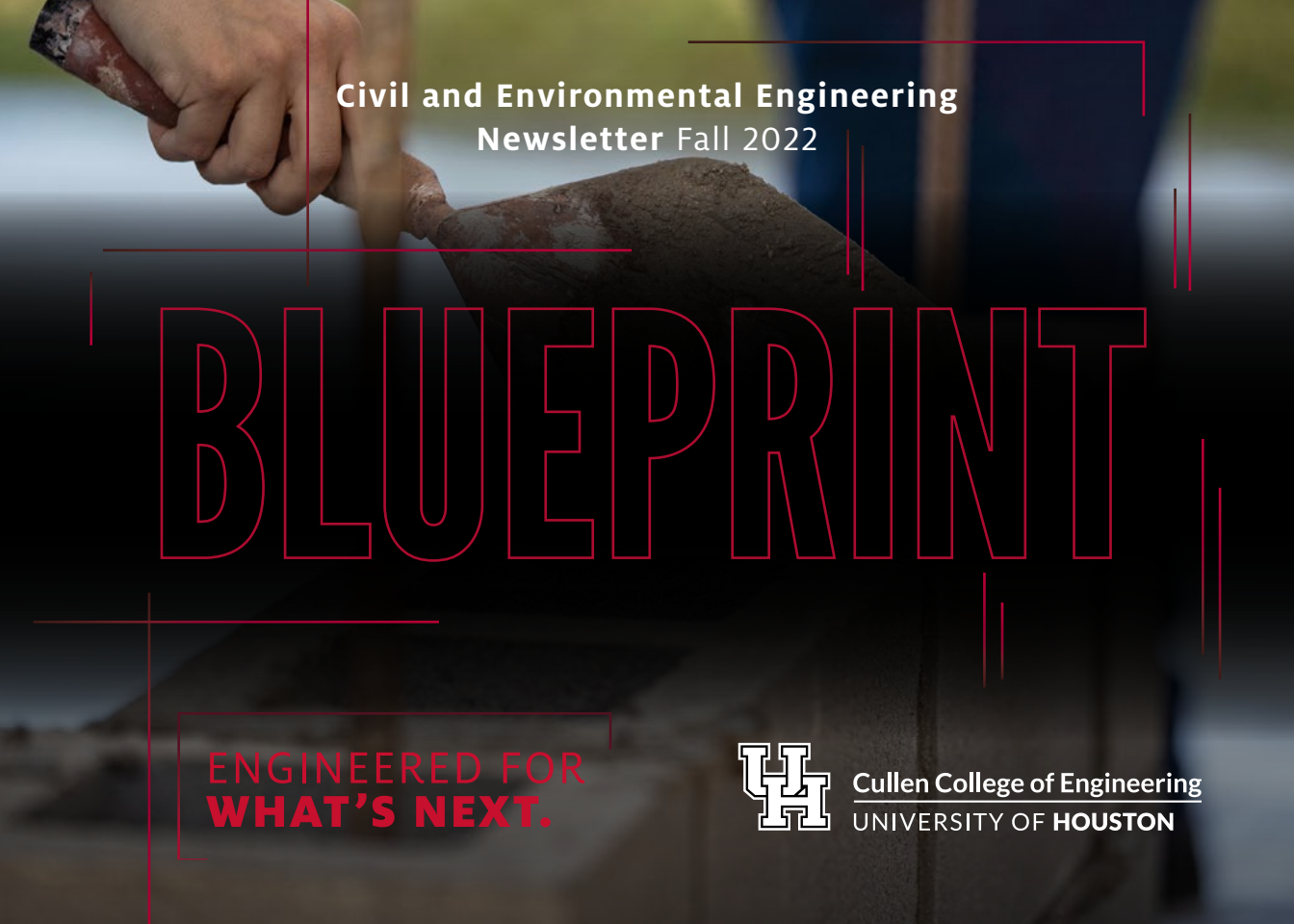

Civil and Environmental Engineering
Newsletter Fall 2022

BLUEPRINT

ENGINEERED FOR
WHAT'S NEXT.

Cullen College of Engineering
UNIVERSITY OF **HOUSTON**

Letter from the Chair

Dear Colleagues,

Greetings from the UH Civil and Environmental Engineering Department! I hope that you are well. The last six months have been a very busy time for our department. I invite you to explore the following stories which represent a small sampling of the exciting work being doing by our faculty and students. If you see opportunities for collaboration, do not hesitate to reach out, and I invite you to come visit whenever you have a chance.

Warm Regards,

Roberto Ballarini, Ph.D, P.E.
Thomas and Laura Hsu Professor and Department Chair
Civil and Environmental Engineering
Cullen College of Engineering
University of Houston

UH CEE **BY THE NUMBERS**

FACULTY *(SPRING 2022)*

1 NATIONAL ACADEMY OF ENGINEERING MEMBER

NATIONAL ACADEMY OF ENGINEERING

ENROLLMENT *(SPRING 2022)*

336 UNDERGRADUATE STUDENTS

104 GRADUATE STUDENTS

DEGREES AWARDED
(2021 - 2022)

65 B.S.

23 M.S.

8 PH.D.

UH CEE WELCOMES

NEW FACULTY MEMBERS FOR FALL 2022

Ruda Zhang has joined the department as an assistant professor. Their research focuses on machine learning, engineering systems, and uncertainty quantifications.

Surui Xie joined the department as an assistant professor. For the past two years, he was a postdoctoral scholar at the Scripps Institutions of Oceanology.

RIFAI TO LEAD CONSORTIUM

TO ENHANCE CYBERSECURITY

As the nature of digital warfare evolves, the need for a workforce trained in cybersecurity is critical for defending the United States from attacks. In response to the growing threat and the need for talent, the University of Houston has joined a consortium funded by the U.S. Department of Defense (DoD) to launch a virtual institute that will recruit and train the next generation to combat cyber warfare, including cyber espionage and attacks on the electromagnetic spectrum.

The virtual institute, called VICEROY (Virtual Institutes for Cyber and Electromagnetic Spectrum Research and Employ) DECREE, will be led by Northeastern University. It will offer a two-year scholarship program focused on advanced cybersecurity, the electromagnetic spectrum, cryptography, data science, DoD research and strategic foreign languages, including Chinese, Russian, Arabic, Persian and Korean. The program will be offered across five universities, including UH, Northern Arizona University, the University of Texas at Austin and the University of South Carolina, and will include experiential learning opportunities, such as co-op positions at the DoD and other employers within the consortium partners' networks.

"The VICEROY DECREE virtual institute consortium model is transformational. It brings together the best offerings from multiple institutions to meet the workforce training needs in these domains," said **Hanadi Rifai**, Moores Professor of civil and environmental engineering and UH team lead on the project.

The scholarship program will fund 60 students and is open to veterans, ROTC students and civilians, with a particular emphasis on underrepresented minorities, women and those from economically disadvantaged backgrounds. Students eligible to enroll must be security clearance-eligible U.S. citizens.

KALLIONTZIS RECEIVES 2 GRANTS TO STUDY

CONCRETE PERFORMANCE

A professor at the Cullen College of Engineering has received a pair of grants that will utilize the one-of-a-kind machinery available at the University of Houston to conduct research into shear failures for a new type of concrete, UHPC.

Dimitrios Kalliontzis, an Assistant Professor in the Civil and Environmental Engineering Department, said the research will investigate the performance of structures using a new concrete material, Ultra-High-Performance Concrete (UHPC).

"UHPC is new to civil engineering and it is considered an emerging technology that promises to tackle aging effects and enhance the structures' robustness and durability," Kalliontzis said. "While UHPC is attracting significant attention from industry, the significant lack of experimental data hinders the development of design code provisions. Without those provisions, there is no official guidance to the field implementation of UHPC structures. Our two research projects will generate the necessary data to support the development of provisions for the design of UHPC against shear failures."

Kalliontzis noted that the American Concrete Institute (ACI) and Precast / Prestressed Concrete Institute (PCI) chose UH for the research because of the unique hardware present at the Cullen College of Engineering.

"What's important about this research is that it leverages the Universal Panel Tester, a one-of-its-kind machine in the United States, which is located in the Structural Research Laboratory of University of Houston," he said.

The ACI and PCI research will span three years, with funding of about $100,000. Additional material and product support will be provided by industry partners, including Steelike and Tindall.

University of Houston | Cullen College of Engineering

ASSESSING FLOOD RISKS USING RADAR TECHNOLOGIES

With a $675,000 grant from NASA, researchers at the University of Houston's Cullen College of Engineering and the University of California, Irvine are launching a new flood risk assessment project focusing on sandy beaches and dunes.

Pietro Milillo, Assistant Professor of Civil and Environmental Engineering, will work on the research with Brett Sanders, UCI Professor of Civil and Environmental Engineering. Together, they will develop new observational strategies and techniques to measure sandy beaches and dunes, and use technologies like interferometric synthetic aperture radar and lidar, which involves targeting an object with laser light to obtain precise size and distance measurements.

In an early phase of the project, the team will data provided by the German Aerospace Center's TanDEM-X and NASA's IceSAT-2 satellites with surface elevation models and lidar observations at four beach/dune sites in Southern California. The researchers will conduct measurements on a monthly and in some cases sub-monthly basis for three years.

The team will seek answers to several key questions, including: How can large-scale geological hazards be accurately forecast in a socially relevant timeframe? How will local sea level change along coastlines around the world in the next decade to century? And what processes and interactions determine the rates of landscape change?

FACULTY ACCOLADES

ROBERTO BALLARINI

HONORED AS ASME FELLOW

Roberto Ballarini, Thomas and Laura Hsu Professor and Department Chairman of Civil and Environmental Engineering, has been honored with election to the Fellow grade of membership for the American Society of Mechanical Engineers (ASME). Only about 3,000 members of ASME are Fellows, out of a total membership of about 75,000.

Ballarini joined the Cullen College of Engineering as Department Chairman in the Fall of 2014. He previously served as James L. Record Professor and Head of the Department of Civil Engineering at University of Minnesota, Leonard Case Professor of Engineering at Case Western Reserve University, and F.W. Olin Professor of Mechanical Engineering at the Franklin W. Olin College of Engineering. Ballarini is also a Past-President of the ASCE Engineering Mechanics Institute (EMI) and currently serves as Editor of the ASCE Journal of Engineering Mechanics.

In 2019, EMI awarded him the Raymond D. Mindlin Medal, "For the application of elasticity and fracture mechanics to problems in numerous disciplines and at multiple length scales, and for seminal contributions to experiments for measuring the mechanical properties of materials and structures at the micro- and nano-scales." The medal is named after the Columbia University professor, who is considered a giant of 20th Century mechanics (and coincidentally was Ballarini's "academic great-grandfather").

DEBORA RODRIGUES

NAMED PROGRAM OFFICER AT NSF

After a competitive selection process, the U.S. National Science Foundation has chosen **Debora Rodrigues**, Ezequiel Cullen Professor in the Civil and Environmental Engineering Department at the Cullen College of Engineering, as a Program Director under the Intergovernmental Personnel Act. Rodrigues will be the Program Director for the NSF Partnerships for Innovation Program. According to the NSF, the program has a history of providing opportunities for innovative researchers to turn academic research into tangible solutions to societal challenges. The program supports use-inspired translational research, prototype development and the enhancement of partnerships across U.S. academia, nonprofits and industry.

Rodrigues has experience as a CAREER award winner and has earned NSF I-Corps grants.

Through just 2018, Rodrigues has earned more than $4.7 million in grant funding from major organizations like the NSF, EPA and the Department of Energy, among others. She also holds three patents related to water filtration or purification. Water quality and sustainability is her primary research interest.

Rodrigues' appointment is for one year, but can be extended up to four additional years.

ROBERTO BALLARINI

CHOSEN FOR STANFORD VISITING PROFESSORSHIP

A Cullen College of Engineering professor has been chosen for a Visiting Professorship position at Stanford University for part of the Fall 2022 semester.

Roberto Ballarini, Thomas and Laura Hsu Professor and Department Chairman of Civil and Environmental Engineering, will hold the Shimizu Visiting Professorship. In this role, he will be collaborating with faculty and graduate students at Stanford.

In addition to being the chairman of CEE, Ballarini also serves as the director of the UH-Dalian Maritime University Institute, a partnership between the University of Houston and the Dalian Maritime University International Institute in China. In 2021, Ballarini was honored with ASCE Distinguished Member Status, and he also won the 2019 Mindlin Medal.

BELARBI EARNS AMERICAN CONCRETE INSTITUTE SERVICE AWARD

A Cullen College of Engineering professor has been recognized for his distinguished service with the American Concrete Institute (ACI).

Abdeldjelil "DJ" Belarbi, Ph.D., Hugh Roy and Lillie Cranz Cullen Distinguished Professor in the Civil and Environmental Engineering Department, is one of the recipients this year of the Delmar L. Bloem Distinguished Service Award. He is the first University of Houston professor to receive the honor.

The Distinguished Service Award was established in 1969 to recognize noteworthy work on ACI technical committees. The name of the award was changed to the Delmar L. Bloem Distinguished Service Award in 1972 in honor of the late Bloem. The award is given to a current or recent chair of an ACI technical committee, or under special circumstances, to deserving individuals other than committee chairs, in recognition of outstanding performance.

Belarbi has been an active member of ACI since 1989 and has served in several national and international technical and educational committees. During the last three decades, he held several officer positions within ACI and chaired several technical committees. As a member of ACI-440 committee (Fiber-Reinforced Polymers Reinforcement), he co-authored several technical documents on the subject. Belarbi served as the Chair to the Joint ASCE-ACI-445 committee (Shear and Torsion) for seven years and under his leadership, he led the development of a technical document on torsion of structural concrete.

As part of his ASCE-ACI 445 chairmanship and more recently, Belarbi led an international effort to assess and revise the current shear design procedures for reinforced concrete. This exercise resulted in revised design equations that were implemented in the 2019 ACI Building Code (ACI318-19). Belarbi's leadership and team effort were recognized by him receiving the 2019 nVent Lenton Award, and now, this 2022 Delmar L. Bloem Award.

The University of Houston
Cullen College of Engineering

The University of Houston Cullen College of Engineering addresses key challenges in energy, healthcare, infrastructure, and the environment by conducting cutting-edge research and graduating hundreds of worldclass engineers each year. With research expenditures topping $40 million and increasing each year, we continue to follow our tradition of excellence in spearheading research that has a real, direct impact in the Houston region and beyond.

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UNIVERSITY OF HOUSTON

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