## SCHOOL OF Sustainable Engineering and the Built Environment

Annual Report

At the Interface of Sustainable Engineering and Science



Gary R. Linthicu President, Linthicum Col

### Ira A. Fulton Schools Of Engineering

#### **Dean Kyle Squires**

Transcending the traditional

Focusing on the student experience and student success

Inspiring future engineers

Pursuina use-inspired research

Attracting top faculty



school of sustainable engineering and the built environment **School Director G. Edward** Gibson, Jr.

Biofuels Waste conversion to energy Public healthtechnologyenvironment interactions Microorganismhuman health connections Infrastructure and product lifecycle analysis Earth systems engineering Water purification Resource-climate interactions Indoor air quality Sustainable Construction Transportation Materials and Systems **Project Performance** 

Underground Infrastructure

Construction Management



school of computing, informatics, and decision systems engineering School Director Sandeep Gupta

Personalized learning **Educational** gaming Energy-efficient data storage and computing Health informatics Haptic interfaces Assisting devices Health care system logistics Information assurance **Production** logistics Artificial intelligence Transportation **Production** logistics

school of electrical, computer and energy engineering **School Director** Stephen M. **Phillips** 

**Photovoltaics** Power and energy systems **Biosignatures** discovery automation Wireless implantable devices Sensors and signal processing Flexible electronics Power arid management and stability Sensors and sensing

school for engineering

transport and

**School Director** 

energy

Lenore Dai

Personalized

Engineering

K-12 STEM

Electrical energy

Thermal energy

Energy production

Therapeutics and

Rehabilitation and

intelligent materials

High-performance

bioseparations

Adaptive and

computing

simulations

processes

Atmospheric

storage and

conversion

separations

robotics

education

storage

learning



#### school of biological and health systems engineering School Director Marco Santello

Medical diagnostics Rehabilitation Neuroengineering Biomaterials and therapeutics delivery Synthetic and systems biology Healthcare technology



#### polytechnic campus **School Director** Ann McKenna

Air Traffic Management Air Transportation Management Applied Science Environmental Resource Management **Graphic Information** Technology Industrial and Organizational Psychology Information Technology Manufacturing Engineering **Professional Flight** Technological Entrepreneurship and Management Aviation Management and Human Factors Environmental Technology Management Global Technology and Entrepreneurship Management of Technology Simulation, Modeling, and Applied Cognitive Science, Ph.D.

School of Sustainable Engineering and the Built Environment

## What's Inside





## School of Sustainable Engineering and the Built Environment

PO Box 873005 Tempe, AZ 85287-3005

Visit us on line at: ssebe.engineering.asu.edu

#### Director

G. Edward Gibson, Jr.

Editor Judy Reedy

Design and Productior	Н
Production: Artcraft, Inc.	
Design: Brandon Nelsor	า

#### Contributing Writer/ Photography

Joe Kullman Jessica Hochreiter Rose Serago Allie Nicodemo Monique Clement Erik Wirtanen Karishma Albal







## Undergraduate Degrees Conferred:

62 Construction12 Construction Engineering143 Civil

## Graduate Degrees Conferred:

- **39** Construction Masters
- **3** Construction PhD
- **24** Construction
- Engineering Masters
  68 Civil Masters
- **10** Civil PhD





## Enrollment: 1721

1302 Undergraduate
 280 MS
 139 PhD

## Faculty

- 48 Tenured and Tenure-track Faculty
   6 Full Time Lecturers
   12 Research Faculty
- **3** Professor of Practice



### SSEBE Research Expenditures

2017: \$18,195,803 2016: \$16,643,055

2015: \$13,425,740

### **National Academy of Engineering Members:**

Edward Kavazanjian, Jr. Bruce Rittmann Total Scholarships and Fellowships Awarded 2017: \$311,271

## National Academy of Construction Members:

G. Edward Gibson, Jr. William Badger (emeritus)

# **ASU Charter**

ASU is a comprehensive public research university, measured not by whom it excludes, but by whom it includes and how they succeed; advancing research and discovery of public value; and assuming fundamental responsibility for the economic, social, cultural and overall health of the communities it serves.

## Mission

Demonstrate leadership in academic excellence and accessibility

Establish national standing in academic quality and impact of colleges and schools in every field

Establish ASU as a global center for interdisciplinary research, discovery and development by 2020

Enhance our local impact and social embeddedness

**Greetings!** ASU's published Charter and guiding Mission & Goals are provided on the facing page. Our School continues to be aligned with this broad vision as many of the articles in this report attest. Our national reputation for teaching, discovery, research and creativity is leading to many visits from peers representing other universities, research agencies and industry. I feel privileged to work with our outstanding faculty, staff and students.

The theme of this year's annual report is "At the Interface of Sustainable Engineering and Science." As you read the articles in this 2017 report, you will see that our faculty, staff and students are pursuing a sustainable future for our world, and the efforts outlined in this report are merely a small indication of the many activities that are on-going in our School. We are working across boundaries of disciplines such as chemistry, biology, materials, and behavioral sciences to develop useinspired solutions to many of the problems facing our world. Among the features in this report, we showcase the diversity in our faculty and students which is important for our future workforce, the ways our faculty are creating renewable energy sources, how they are addressing resiliency of our infrastructure in the face of climate change, how they are interfacing closely with material, biological and chemical sciences in terms defining new ways to design systems, how they are addressing transportation systems improvement in a holistic manner, and how they are addressing the moral and ethical impacts of technological change and conflict.

It has again been a successful year for our School. In fall 2017, our enrollment grew to 1721 total students up slightly from 1702 in 2016. Our research expenditures grew to \$18.2 million in 2017 up from \$16.5 million in 2016. We worked hard to develop and deploy a new environmental engineering undergraduate program which began offering classes in fall 2017 with 60 students; we feel this is a key for our future growth and student applications for 2018 are very high. The number of prestigious awards that our faculty have received in the past year is again impressive. Our students continue to demonstrate their prowess, again winning a number of prestigious awards and competing very successfully at regional and national competitions. During 2017, we matriculated over 350 graduates, who all the while engaged in helping our local and regional community, and the world, in a number of outreach activities.



Our programs attract representatives from many companies locally and nationally as participants in teaching, research and recruiting. As a testament to this interest and involvement, we again held several career fairs in 2017, with over 120 companies setting up booths in the new CAVC building, specifically recruiting our students. We also re-instituted the induction of outstanding alumni and hall of fame members, and as you can see in the enclosed article we have tremendous leadership coming out of our programs.

Recruiting of outstanding faculty members is a critical success factor for our School, and during 2017 we welcomed **Wanda Dalla Costa**, **Margaret Garcia, Rebecca Muenich, Anca Delgado, Leon van Paassen, Tony Lamanna**, and **Celina Dozier** to our faculty ranks. We also hired a number of outstanding research professors and scientists, **Sergio Garcia-Segura, Nasser Hamdan**, and **Sara Khoeini**. The coming year promises more hiring, as we are pursuing faculty members for as many as four additional positions. None of these accomplishments in 2017 could have been possible without the great work of our faculty and staff.

I am again very optimistic about the future. We have a great faculty and staff, along with wonderful students; please visit if you are in the Tempe area!

**G. Edward Gibson, Jr., PhD, PE** *Professor and Sunstate Chair Director*, School of Sustainable Engineering and the Built Environment

## **Program Chair Updates**



## **Civil, Environmental, and Sustainable Engineering (CESE)**

#### Keith D. Hjelmstad, Ph.D. Professor and CESE Program Chair

This year has been another active one for our students, faculty, staff, and external partners. We are now among the largest civil engineering programs in the country. The challenges of operating this large a program are far outweighed by the satisfaction of making a positive impact on society by producing many outstanding civil engineers who will be the innovators and problem-solvers of the next generation.

We continue to appreciate the efforts of our Friends of Civil Engineering (FOCE)—an organization comprising some of the top civil engineering firms and governmental agencies in the region. The FOCE steering committee brings the leaders of these organizations to campus regularly to help us think through some of the issues that we face and to help our students develop as engineers. Special thanks to Ron Hilgart, founder and Principal of HILGARTWILSON, who has chaired the steering committee for the past two years.

Several of our faculty participate in a *Community of Practice* for teaching, having participated previously in a National Science Foundation program that got the community started. As we move forward with our vision of the future of civil engineering education, these faculty will play an instrumental role. I am impressed by their commitment to undergraduate education and their willingness to innovate in the classroom.

We get better every year, we do more every year, and we keep finding ways to bring significant impact to the world around us. I am looking forward to another great year!



## **Construction Engineering**

#### Samuel T. Ariaratnam, Ph.D., P.E., P.Eng., F.ASCE Professor and Construction Engineering Program Chair

Our program has had another successful year as we continue to grow. Sparked by a strong construction industry sector, our entire senior undergraduate and a majority of our graduate students received excellent job offers this past year. I believe that our rigorous curriculum and strong internship program are major reasons for this job success. Feedback from employers has been extremely positive as they cite the ability of our Construction Engineering graduates to understand both the design and construction aspects of the industry, adding value to their core business.

Our overall enrollment is strong as we continue to attract the brightest students both domestically and internationally. In particular, our Master's Degree program continues to see strong enrollment numbers. Additionally, I am pleased to see many of our SSEBE undergraduate students taking advantage of the 4+1 program in Construction Engineering.

Our program continues to emphasize planning, design, and management for the construction of infrastructure including bridges, airports, pipelines, and other systems that are vital to our nation's economy. Producing high-quality Construction Engineers is imperative as our nation seeks to address an infrastructure network in varying stages of deterioration.

We will continue to maintain our strong educational curriculum, increase our enrollment to meet industry demands, and further cultivate fundraising efforts to support innovative program initiatives. I am very optimistic about our future and the future of our industry!



## Del E. Webb School of Construction (DEWSC)

#### Anthony J. Lamanna, PhD, PE, F.ACI, F.ASCE, Associate Professor · Del E. Webb School of Construction Program Chair

The Del E. Webb School of Construction offers undergraduate and graduate degrees and is a national leader in construction higher education. The DEWSC has the highest number of construction faculty of any construction program in the nation, and many have received national awards for their research, teaching, and service. The Del E. Webb School of Construction continues to improve our program to suit the needs of the industry and equip our students with the skills and knowledge they need to have successful careers.

We have transitioned to a student learning outcome based assessment process, which focuses on measuring what the students are learning, rather than measuring what the faculty are teaching. This is a better measure of the skills the students have when they graduate and begin their careers.

Our students continue to participate in national competitions and be involved in national professional groups. These activities help build the interdisciplinary, teamwork, and leadership skills that are difficult to teach in a classroom setting. This would not be possible without both the financial support and time you, our industry partners, spend mentoring the student teams and groups. Going forward, we have a goal of 90% student participation in professional groups and meetings, so we will continue to encourage our students to become active in these worthwhile activities.

Thanks to Professor Allan Chasey, the previous Program Chair, we are the recipients of a National Association of Home Builders (NAHB) Homebuilding Education Leadership Program (HELP) grant to help improve our residential construction and development offerings.

We have rearranged our Industry Advisory Council into multiple committees: Academic Improvement, Branding, Continuing Education, Innovation and Technology, Recruitment and Retention, and Golf. The hope is in addition to support from the usual suspects, we can engage some of our more recent graduates to participate in making DEWSC the number one program in the nation.

## **Program Chair Updates**



## **Environmental Engineering**

#### Treavor H. Boyer, PhD

#### Associate Professor · Environmental Engineering Program Chair

The new Environmental Engineering (EVE) undergraduate program at Arizona State University officially started in August 2017 with approximately 50 students enrolled in the program. The EVE program offers a Bachelor of Science in Engineering (BSE) in Environmental Engineering and will seek ABET accreditation. The mission of the EVE program is to educate tomorrow's engineers to solve complex environmental problems and design systems at the human, urban, and planetary scale. The EVE program includes new courses that span introductory concepts to fundamental understanding to engineering design, and also includes a new environmental engineering processes lab course and required summer internship or research experience.

Highlights from the current 2017–2018 academic year include establishing EVE section of ASU 101, offering several new EVE courses (EVE 214 Environmental Engineering Mechanics, EVE 261 Introduction to Environmental Processes, and EVE 302 Environmental Engineering Fundamentals: Physical and Chemical Processes), holding Environmental Engineering career fair, and having first meeting of the EVE External Advisory Board. The EVE External Advisory Board has members from local and national engineering consulting firms, city government, and industry. The EVE External Advisory Board is expected to play a key role in connecting EVE students with the environmental engineering profession. I look forward to updating you on the progress and accomplishments of the new EVE program in the coming years.



## **Graduate Program**

#### Peter Fox, PhD, PE Professor and Graduate Program Chair

The School of Sustainable Engineering and the Built Environment graduate degree programs encompass Civil, Environmental and Sustainable Engineering (CESE), Construction Management (CON) and Construction Engineering (Con Eng) - CESE MS, CESE PhD, CON MS, CON PhD and Con Eng MSE.

The high quality of our research continues with our participation in two National Science Foundation Engineering Research Centers. Engineering Research Centers are the most prestigious grant awards given by the National Science Foundation. Our leadership and participation in these centers has gained us prestigious recognition from other top universities and industry partners.

We continue to have more than 100 PhD students and our PhD student enrollment is growing as a consequence of our success at obtaining research centers and funding. We have continued to increase the number of enrolled under-represented groups and our goal to make our program more diverse and inclusive is being embraced by our faculty and research sponsors.

The CESE Master's degree program has been streamlined with the elimination of the MSE degree and the addition of the applied project option to the MS degree. On-line course offerings continue to grow with two on-line MS degree programs in Construction Management and Sustainable Engineering. The accelerated MS degree program has helped us retain our best students and keeps us well positioned for the future where the MS degree is becoming critical to working professionals.

## **New Faculty Join SSEBE**



#### Wanda Dalla Costa, MA

Associate Professor MS, University of Calgary, MDR, Southern California Institute of Architecture

Joint Appointment in SSEBE and The Design School

Joined SSEBE in January 2018 (previously Visiting Eminent Scholar in 2016 and 2017)

**Areas of Research:** Indigenous architecture, planning and placekeeping; community engagement; sustainable design



#### Anca Delgado, PhD Assistant Professor PhD, Arizona State University

Joined SSEBE in August 2017

**Areas of Research:** Soil microbial processes, bioremediation, microbial kinetics, bioreactors, analytical chemistry



Celina Dozier, PhD

Lecturer PhD, The University of Texas at Austin

Joined SSEBE in January 2018

**Areas of Research:** Computer Methods, Fluid Mechanics, Environmental Sampling and Analysis Lab



#### Margaret Garcia, PhD Assistant Professor PhD, Tufts University

Joined SSEBE in August 2017

**Areas of Research:** Water system sustainability and resilience, systems analysis, socio-technical systems



#### Sergio Garcia-Segura, PhD Assistant Research Professor PhD, University of Barcelona, Spain

Joined SSEBE in July 2017

**Areas of Research:** Development of electrochemical and photoelectrochemical water treatment technologies











#### Nasser Hamdan, PhD

#### Assistant Research Professor PhD, Arizona State University

Joined SSEBE in January 2017

Areas of Research: Biogeotechnics, Biogeochemistry, Geomicrobial Processes, Soil Treatment and Stabilization

#### Sara Khoeini, PhD

#### Assistant Research Professor PhD, Georgia Institute of Technology

Joined SSEBE in February 2017

Areas of Research: Travel behavior analysis and demand modeling. Travel survey methods, Sustainability and Energy

### Anthony Lamanna, PhD

#### Associate Professor and DEWSC Program Chair PhD, University of Wisconsin

Joined SSEBE in July 2017

Areas of Research: Anchorage to Concrete, Sustainable Development, Resilient Systems, Adaptive Reuse

#### Rebecca Muenich, PhD Assistant Professor PhD, Purdue University

Joined SSEBE in August 2017

Areas of Research: Environmental modeler focused on trade-offs within the food-energy-water nexus

#### Leon van Paassen, PhD

#### Associate Professor PhD, Delft University of Technology

Joined SSEBE in January 2017

Areas of Research: Engineering Geology, Environmental Biotechnology, Geotechnical, Geo-Environmental and Mining Engineering, Biogeotechnical Engineering

## Faculty Fellowship Program

Israel offers as intriguing a panorama of cultural, historical, religious and political significance as just about any place in the world. An opportunity to meet some of the people and see some of the prominent places at the center of such a pulsating environment draws interest from hundreds of faculty members at colleges and universities in the United States in joining the two excursions each year to Israel organized by the Jewish National Fund.

Additional motivation comes from the prospects of establishing relationships with Israeli scholars and researchers who could become valuable professional collaborators.

From among more than 150 applicants for the inaugural Winter Faculty Fellowship Program in Israel, the selected group of 23 participants includes seven Arizona State University faculty members — more than from

any other educational institution.



One of the participants, Assistant Professor **Francois Perreault** in the School of Sustainable Engineering and the Built Environment, hopes to team up with Israeli researchers to make progress on new technologies for water treatment and desalination. "These are critical issues in Israel, as in Arizona and the rest of the United States, and Israel has been a leader in many aspects of desalination and water reuse," Perreault says. "I think that the relevance of my research to Israel is what got me selected for the fellowship program." From December 27 to January 9, the U.S. contingent will meet with professors from at least 28 Israeli colleges and universities who have

similar academic and research interests, as well as with Israeli government, industry, news media and higher education leaders.

The Faculty Fellowship in Israel Program takes participants to major historic and cultural sites such as Masada, where there are remains of an ancient fortress overlooking the Dead Sea in the Judean Desert. Dating to about 30 B.C., the site includes the ruins of King Herod's palace. Recreations of historical scenes and archaeological exhibits are on display in the Masada Museum. *Photographer: René Reinhard/ Jewish National Fund.* 



Mikhail Chester's research on preparing infrastructure for extreme events and climate change has been rewarded with the 2017 Walter L. Huber Civil Engineering Research Prize by the American Society of Civil Engineers, which recognizes notable achievements in civil engineering research. Chester's research focuses on the Southwest United States, specifically the region's extreme heat and urban flooding hazards. His work centers on identifying how infrastructure is vulnerable to climate change, how failures propagate across infrastructure, and which strategies are most appropriate for protecting infrastructure and adapting to climate change.



## Leading The Way On Creative Collaboration In Construction Project Management

#### Design-Build Institute of America (DBIA) 2017 Distinguished Leadership Award in the Faculty Category

**Mounir El Asmar's** work is having a growing impact on construction industry practices as he continues to push the boundaries of innovation in construction engineering and management.

His research accomplishments and the value they are bringing to multiple areas of the construction field were recognized recently when he was awarded the **2017 national Distinguished Leadership Award** from the Design Build Institute of America at the organization's annual conference in Philadelphia. Mounir El Asmar (at right) has been recognized by a national construction industry organization as a leader in research that is advancing innovative methods for managing engineering and construction projects. He is pictured with Myles Morton, a 2013 graduate of the Del E. Webb School of Construction.

The award acknowledges El Asmar's contributions and leadership in advancing the Design-Build project delivery approach that focuses on fostering close collaborative working relationships between project owners, designers and builders.

Professor Edward Kavazanjian, Jr. has been elected to the University of California, Berkeley's Civil and Environmental Engineering Academy of Distinguished

**Alumni**. He earned his doctoral degree at Berkeley in civil engineering, specializing in geotechnical engineering. Kavazanjian is an international leader in the field of geotechnical engineering, particularly landfill engineering and seismic design to fortify structures against the impact of earthquakes.



Edward Kavazanjian, Jr. (center)

## Rittmann's Far-Ranging Accomplishments Earn Growing Recognition

More than three and a half decades of exceptional contributions to research, scholarship and professional service, as well as steadfast dedication to teaching and mentorship, have earned Fulton Schools Regents' Professor **Bruce Rittmann** the honored status of **Fellow** in the Association of Environmental **Engineering and Science Professors**.

The international organization's membership of about 700 boasts some of the most



accomplished professors who provide education in the sciences and technologies of environmental protection.

The AEESP Fellow designation adds to Rittmann's voluminous list of awards and achievements. Among the most prestigious was his election to the **National Academy of Engineering** just before joining Arizona State University in 2004. He has since become a **Distinguished Member of the American Society of Engineers** and been named an **ASU Regents' Professor** – the highest designation bestowed on faculty members in the state's three universities.

Rittmann has been the director of the Swette Center for Environmental Biotechnology in ASU's Biodesign Institute for more than 12 years, and last year his significant contributions to that field earned him another AEESP award.

Earlier this year, he was also made a **Fellow of the National Academy of Inventors**. He's now a Fellow in several of the leading professional organizations dedicated to the branches of science and engineering on which his research focuses.

Rittmann is also the recipient of the **2017 Daniel Jankowski Legacy Award**. The award, which is one of the highest distinctions a Fulton Schools faculty member can achieve, recognizes engineering faculty with unparalleled contributions to education, research and public service with long-standing, demonstrated impact on advancing the mission and values of the Fulton Schools.

Other recognitions this year include the Telford Premium 2017 Award, Institution of Civil Engineers (UK) and the "Gold Medal" Award: Membrane for concentrated CO<sub>2</sub> delivery to cultures, Bruce Rittmann (and Klaus Lackner), ASU, Algae Industry Magazine 2017 International Readers' Poll.



Sandra Houston was invited to deliver The First Pan American Distinguished Lecture on Unsaturated Soils. This honor is in recognition of research that is highly significant in its contribution, impact and vision and awarded in international competition.

> **Paul Westerhoff** was named **Regents' Professor at Arizona State University**. This is the highest honor bestowed on faculty members at Arizona's three state universities. The title recognizes accomplishments in research, education, scholarship, creative endeavors and public service that have brought national and international distinction.





Professor Ram Pendyala (right)

American Road & Transportation

Steinberg Award by Rensselaer Polytechnic Institute Professor

was recently presented the

**Builders Association's S.S.** 

Jose Holguin-Veras, the

chair of ARTBA's Research

and Education Division. The

award recognizes outstanding

contributions in teaching and

engineering and related areas.

Photo courtesy of Ram Pendyala

research in transportation

## Award Spotlights Pendyala's Wide-Ranging Impact On Progress In Transportation Field

Contributions over the past 25 years to education and research, along with endeavors that have made him an international leader in the transportation field, have earned Ram Pendyala high recognition from the American Road & Transportation Builders Association.

The far-reaching impact of his work in multiple facets of transportation engineering and related areas was emphasized in the organization's announcement of Pendyala's selection as the **S.S. Steinberg Award** winner recently at the annual meeting of its Research and Education Division in Washington, D.C.

The professor of civil, environmental and sustainable engineering was honored for research that has advanced multimodal transportation systems planning, travel behavior modeling, time use and activity pattern analysis, freight and passenger transportation demand forecasting, travel survey methods, microsimulation approaches and the study of transformational technologies in transportation.

His expertise extends also to sustainable mobility management strategies, analysis of public transportation systems, and integrated modeling of land use, transportation, energy and air quality systems.

Pendyala has conducted research and served as a consultant on numerous local, regional, national and international transportation projects, including acting as a transportation infrastructure evaluation consultant for the World Bank.

His accomplishments include winning the U.S. Transportation Research Board's Pyke Johnson best paper award in 2011 and 2013, and being named the director of the **U.S. Department of Transportation Tier 1 University Transportation Center for Teaching Old Models New Tricks** that is led by ASU.



The PENTA Building Group Faculty Fellowship

**for 2017-18** has been awarded to **Kenneth Sullivan**, associate professor in the School of Sustainable Engineering and the Built Environment. The expectation of the PENTA Building Group Faculty Fellowship is that awardees will be working on teaching, accreditation, and program development and outreach for undergraduate and graduate students in the Del E. Webb School of Construction.

Francois Perreault, assistant professor in SSEBE received the Environmental Science: Nano 2017 SNO Emerging Investigator Award at the 6th Sustainable Nanotechnology Organization Conference 2017 in Los Angeles, California.



## Propane Pro: Ariaratnam Named To National Committee Studying Safety Of Pipeline Infrastructure

Six million American households rely on propane gas to heat their homes and water, dry their clothes and barbeque their pork chops.

Farmers use propane to heat livestock housing and greenhouses, dry crops and power farm equipment and irrigation pumps.

Many businesses employ propane to power equipment ranging from forklifts to electric welders.



Transporting this fuel to homes and establishments across the United States requires an elaborate system of storage tanks and pipeline facilities. And since this volatile gas can displace oxygen to cause asphyxiation and is highly flammable and explosive, the safety of these systems is an imperative focus.

Commissioned by Congress, this National Academy of Science, Engineering and Medicine committee's "Study on Propane Gas Pipeline Facilities" is part of the Protecting our Infrastructure of Pipelines and Enhancing Safety Act of 2016, known as the PIPES Act, signed by former President Barack Obama in June 2016.

Ariaratnam and the committee will be studying the current regulatory framework and making recommendations on possible modifications to reduce the compliance burdens of smaller systems – defined as 100 or fewer customers – while maintaining top safety.

Additional goals include reviewing techniques and best practices to ensure safe design, installation, operation and maintenance of these smaller systems; and examining the costs and benefits of the regulatory regime, as well as associated techniques and best practices.

Samuel Ariaratnam, a construction engineering professor and program chair, was appointed for a 16-month term to serve on a United States' National Academies of Science, Engineering and Medicine committee studying the safety of the nation's propane pipeline systems.





Steven Ayer





**Kristen Parrish** 



Pingbo Tang

The Cache Valley Electric Lecturer Award for 2017-18 has been awarded to Mounir El Asmar, Steven Ayer, David Grau, Kristen Parrish and Pingbo Tang. The expectation is that awardees will be working on teaching, research, and program development and outreach for undergraduate and graduate students focused on construction management and engineering.



## AZ Water Association Burbank Environmental Educator Award

#### Morteza Abbaszadegan

The Burbank award is given annually to an educator for significant contributions to promoting training activities in the water environment career field in the state of Arizona. Abbaszadegan was honored for his contributions to education and awareness of environmental public health, specifically the microbial quality of drinking water.

## AZ Water Association Quentin Mees Research Award

#### **Francois Perreault**

The award celebrates exceptional research papers and highlights water-related technology. Perreault's paper "Biofouling Mitigation in Forward Osmosis Using Graphene Oxide Functionalized Thin-Film Composite Membranes" was selected for the Quentin Mees Research award.



## **Construction Profession Peers Laud Grau's Outstanding Contributions As Educator And Researcher**

Construction Industry Institute's 2017 Outstanding Instructor and Outstanding Researcher Award

This award recognizes **David Grau** not only for his teaching but also for developing creative instructional methods, his service as a mentor to students and the contributions of high-impact research to the construction professions.

Grau came to ASU in 2013 with more than a decade of industry experience in design and construction coordination, along with experience in industrial, systems and computer engineering.



## **Textile Reinforced Concrete**

Textile reinforced concrete (TRC) has emerged in recent years as an attractive new high performance cement-based composite. Textiles can significantly improve the mechanical behavior of cement matrices under static and dynamic conditions, and give superior tensile strength, toughness, ductility, energy absorption and protection against environmental degrading influences. **Barzin Mobasher**, a professor in SSEBE, is co-author of a new book on this subject.

Flexibility with fabric production methods enables the control of fabric and yarn geometry. This, along with the ability to incorporate into the fabric a range of yarns of different types and



performances, as well as cement matrix modifications, enables design of the composite to a wide range of needs.

The book is intended to provide a comprehensive treatment of TRC, covering the basic fundamentals of the composite material itself and the principles governing its performance on a macro-scale as a component in a structure.

It provides in-depth treatment of the fabric, methods for production of the composite, the micro-mechanics with special attention to the role of bonding and microstructure, behavior under static and dynamic loading, sustainability, design, and the applications of TRC composites.

#### The authors of this new textbook are:

Alva Peled is Senior Lecturer at Ben Gurion University of the Negev, Israel

Arnon Bentur is Dean of Civil and Environmental Engineering at the Technion, Israel, and past President of RILEM

**Barzin Mobasher** is Professor in the School of Sustainable Engineering and the Built Environment at Arizona State University, USA, Current Chair of ACI's committee 544 on Fiber Reinforced Concrete, and author of *Mechanics of Fiber and Textile Reinforced Cement Composites: Manufacturing, Analysis, and Design (CRC Press)* 



**Dr. Rosa Krajmalnik-Brown**, Associate Professor in SSEBE and CBBG Thrust 2 Leader, received \$82,126 from the **Simons Foundation** for her research project, "Targeting Immune System Activation in ASD Models with Probiotic Therapies." The Simons Foundation funds projects that advances research in basic science and mathematics.

## **CBBG Participation at GeoFrontiers Conference**

The Center for Bio-mediated & Bio-inspired Geotechnics (CBBG) was well represented at the ASCE Geo-Institute GeoFrontiers Conference held in Orlando, Florida March 13-16, 2017.

Professors **Ed Kavazanjian**, ASU, Jason DeJong, University of California, Davis and David Frost of Georgia Tech participated in panel sessions on liquefaction, guidance on preparation of NSF sponsored research proposals, and biotechnical slope stabilization, respectively.



Nasser Hamdan

CBBG Industry Collaboration and Innovation Director and Assistant Research Professor, **Nasser Hamdan**, made a presentation to the Geo-Institute Soil Improvement Committee chaired by Kord Wissman of Geopier Foundation Company, a CBBG Industry Partner.

ASU Postdoctoral Scholar, **Hamed Khodadadi Tirkolaei**, presented a paper in the Ground Improvement Session on Mineralogy of Calcium Carbonate in MICP-treated Soil Using Soaking and Injection Treatment Methods.

ASU students **Miriam Woolley**, **Elizabeth Stallings**, and **Caitlyn Hall** participated in the GeoPoster competition. **Miriam Woolley** won 3<sup>rd</sup> place in the GeoPoster competition with her poster entitled, "Effectiveness of Hydrogel-Assisted EICP for Fugitive Dust Mitigation."

Two undergraduate students and two graduate students, including CBBG students **Miriam** 

**Woolley** and **Juan Paez**, participated on the ASU Team in the **MSE Wall competition**. The team qualified for the finals, but did not place.

The ASU team, featuring a rap by CBBG student **Kimberly Martin**, placed first in the **Geo Video competition**. **Kimberly Martin** and team also won first prize for the **T-Shirt Design Competition**.





Namho Cho (Ph.D. student): Namho is studying the long-term performance impact of alternative project delivery methods for highways. Namho is the recipient of the 2017 Design-Build Institute of America (DBIA) Scholarship and the second place Best Poster Award of the 2017 Arizona Pavements/Materials Conference.



Abbas Chokor (Ph.D. 2017): Abbas is a data scientist with Seagate in Boulder, CO. His research focused on predicting the energy consumption performance of complex institutional facilities. He also developed a predictive model for the remaining useful life of solar energy facilities. Abbas received recognition for Outstanding Performance in The PV Component Reliability Project from sponsor First Solar.



Puneet N. Khatavkar received the ASCE 2017 Congress on Technical Advancement STUDENT PAPER AWARD OF MERIT for his paper entitled "Model for the Real-Time Operation of Water Distribution Systems Under Limited Electrical Energy Input."

## Navajo Veteran Explores Engineering Pathways, Mentors Native Students

Every student takes his or her own route to a college education. Some have more twists and turns — and, frankly, years — than others, but every journey is enhanced with mentorship.

Navajo doctoral student **Marcus Denetdale** grew up in Farmington, New Mexico. He wasn't an overly motivated teenager, and didn't see himself pursuing the typical high school to college route.

After high school he joined the United States Air Force and served for four years as an avionics technician working on F-15s.

When he ended his service, he embarked on his "odd jobs phase": waiting tables, working at a natural gas plant, assisting in a funeral home and locksmithing.

But one night in Farmington, 30-year-old Denetdale bumped into Peterson Zah who asked him a question that changed his course: "Have you considered applying to Arizona State University?"

For a Navajo, there's no one better to have a conversation with about attending college than Peterson Zah, the first president of the Navajo Nation, who has led numerous efforts to bring more Navajos to college. He served as special advisor to President Michael Crow on American Indian affairs and earned an honorary doctorate from ASU, his alma mater, in 2005.

Since that conversation in 2009, Denetdale has earned bachelor's and master's degrees from ASU, enrolled in a doctoral program, held ASU staff positions in ASU's Graduate College and the Ira A. Fulton Schools of Engineering, and has been an active member and president of ASU's Tempebased Student Veterans Association.

To say he's merely "gotten involved" is a clear understatement.

Currently pursuing a doctorate in civil, environmental and sustainable engineering, his research focuses on identifying the motivations, catalysts and barriers that Native American students face in their pursuit of an engineering education.

He works closely with tribes to sort and analyze their data concerning students and potential students and the pipeline in which they reach engineering fields.

"We want to identify what factors play a role in Native American students completing a bachelor's degree and, from there, what propels them to attend graduate school or decide what career route they'll pursue," he says.

In the end, the goal of his research is to know how to create a program that successfully mentors these students and helps them reach their goals.

Denetdale was recently appointed program manager of the Del E. Webb School of Construction's Construction in Indian Country program, housed within the School of Sustainable Engineering and the Built Environment. The program helps attract, retain and financially support Native American students studying construction management at ASU, and provides a great platform for Denetdale to engage in mentorship and to enhance his research studies.

The program also organizes design-build projects for students to obtain on-the-job construction management leadership experience on Arizona reservations.

"For me to move forward academically, it took mentors checking in during every step of the way," says Denetdale. "I had mentors say, 'Have you considered a master's degree?' 'Have you looked into undergraduate research?' 'Have you thought about harnessing this passion toward a doctoral dissertation?'"

Within Construction in Indian Country, Denetdale says, "Advisory board members and I are constantly talking to and encouraging our students. We want them to know we have jobs for them, that their community needs them and that we will do everything we can to financially support them."

## **Student Honors and Awards**



Denetdale is currently helping to manage discussions with Chapter House officials in Tuba City, Arizona regarding the possibility of Construction in Indian Country taking on a handful of new design-build projects for the local community.

Amidst all this, Denetdale decided to step down from his position as president of ASU's Student Veterans Association on the Tempe campus to focus more fully on his work with Construction in Indian Country.

But he feels indebted to the network and support the veteran community provided to him when he enrolled as an older, non-traditional undergraduate student, and he will continue his involvement as a co-advisor and as a member of ASU's Alumni Veterans Chapter.

Looking to the future, Denetdale plans to stay involved with student affairs and the administrative side of higher education.

"I want to help that student who has the motivation and aspiration to attend college to overcome the barriers they face, and I want to influence policies and provide solutions to help the student experience go well for all students, regardless of where they come from and how they got there," he says.

Though he's taken a lot of different steps in his journey to become a doctoral student at ASU — from service in the Air Force to odd jobs to staff positions — he says, "My story at ASU can be anyone's story."

## **Outstanding Graduates in the Class of 2017**

#### **SSEBE Outstanding Graduates**

Phil Amezquita (Fall 2017) **Construction Management** 

Hayley Monroe (Fall 2017) **Construction Engineering** 

**Emily Ford** (Fall 2017) **Civil Engineering** 

Nathan Holt (Spring 2017) **Civil Engineering** 

**Abby Boaz** (Spring 2017) **Construction Management** 

**Timothy Taylor** (Spring 2017) Construction Engineering

#### **IMPACT AWARD**

Alexis Butscher (Fall 2017) **Construction Management** 

#### **SSEBE 4.0 AWARDS**

Saleh Albulahi, MS Jake Andresen, MS **Erin Driver, MSE** Victoria Flys, MSE Amelia Ochsenbein, MS Linda Tello, PHD John Thomas, PHD **Peiheng Li, PHD** 



Abby Boaz



**Alexis Butscher** 





Nathan Holt



Hayley Monroe





## **Doctoral Graduates in 2017**

#### Yasir Alhammadi

Developing and Evaluation the Implementation of Construction Management Research in the Saudi Construction Industry Chair: Dr. Dean Kashiwagi

#### Abdullah Almajed

*Enzyme Induced Carbonate Precipitation (EICP) for Soil Improvement* Chair: Dr. Edward Kavazanjian, Jr.

#### Saud Almutairi

Assessment and Develop the Saudi's Contractors Classification System Chair: Dr. Dean Kashiwagi

#### Ahmed Alofi

Improving the Saudi Arabia Procurement System: Perception and Development of the Construction Industry Chair: Dr. Dean Kashiwagi

#### Suleiman Alsafouri

Emerging Information and Communications Technology and the Human Factors to Enhance Design and Constructability Review Processes in Construction Chair: Dr. Steven Ayer

#### **Abbas Chokor**

Probabilistic Risk Assessment Models for Photovoltaic Systems Chair: Dr. Mounir El Asmar

#### **Mohamed Elzomor**

Development of the Project Definition Rating Index (PDRI) for Small Infrastructure Projects Chair: Dr. Kristen Parrish

#### Sofia Esquival

Microbial Communities Involved in Carbon Monoxide and Syngas Conversion to Biofuels and Chemicals Chair: Dr. Rosa Krajmalnik-Brown

#### Ali Fakih

Saline Waste Use for Subgrade Soil Improvement Chair: Dr. Kamil Kaloush

#### Natalia Fischer

Novel Operation of Granular Activated Carbon Contractors for Removal of Disinfection Syproducts Precursors Chair: Dr. Paul Westerhoff

#### Jake Gunnoe

Adaptive Talent Management for Project Professionals: Early Identification of Future Industry Leaders Co-Chairs: Dr. Avi Wiezel and Dr. Kenneth Sullivan

#### Vamsi Sai Kalasapudi

Automatic Change-based Diagnosis of Structures Using Spatiotemporal Data and As-Designed Model Chair: Dr. Pingbo Tang

#### Peiheng Li

A Framework for a Self-Sustained Traffic Operations System Using V2V Communications Chair: Dr. Yingyan Lou

#### Hariharan Naganathan

Energy Analytics for Infrastructure: An Application to Institutional Buildings Chair: Dr. Oswald Chong

#### **Anthony Pesek**

Impact of Construction Document Deficiencies of Heavy/Civil Low-Bid Infrastructure Projects and the Introduction of a Contractor Document Review Assessment Chair: Dr. Kenneth Sullivan

#### Alfredo Rivera

Shifting from Management to Leadership: A Model Adaptation from Procurement to Project Management Co-Chairs: Dr. William Badger and Dr. Kenneth Sullivan

#### Akash Mahendra Sadaria

Environmental Releases of Neonicotinoid and Fipronil Insecticides via U.S. Wastewater Infrastructure Chair: Dr. Rolf Halden

#### Vamsi Sai Kalasapudi

Automatic Change-Based Diagnosis of Structures Using Spatiotemporal Data and As-Designed Model Chair: Dr. Pingbo Tang

#### Levi Straka

Light-Dependent Growth Kinetics and Mathematical Modeling of Synechocystis sp. PCC 6803 Chair: Dr. Bruce Rittmann

#### Linda Tello

Theorizing the State of Health Practices and Climate in Construction via Fourfold Structuration Chair: Dr. David Grau

#### **Nicole Templeton**

Evaluating the Impact of Land Cover Composition on Water, Energy, and Carbon Fluxes in Urban and Rangeland Ecosystems of the Southwestern United States Chair: Dr. Enrique Vivoni

#### Pugashvel Thirthar Palanivelu

Investigation of Subgrade Moisture Flow Caused by Hydro-Thermal Gradients In Airfield Pavements Chair: Dr. Claudia Zapata

#### **John Thomas**

Human Resilience and Development in Coupled Socio-Technical Systems: A Holistic Approach to Critical Infrastructure Resilience Chair: Dr. Thomas Seager

#### Heather Tugaoen

Photocatalysis for Reductive Transformation of Nitrate and Chromate in Drinking Water Co-Chairs: Dr. Paul Westerhoff and Dr. Kiril Hristovski

#### Xuan Xu

Validation of a Numerical Model for Design of Geomembranes Subject to Extreme Loads Chair: Dr. Edward Kavazanjian, Jr.

#### Cheng Zhang

Human-Centered Automation for Resilience in Acquiring Construction Field Information Chair: Dr. Pingbo Tang

#### Zia Ud Din

Teaching Prevention through Design (PtD) Principles Using A Non-Traditional Pedagogical Strategy Chair: Dr. Edd Gibson

## 2017 Scholarships and Fellowships

Scholarships and Fellowships	Recipients
Advancing Women in Construction (AWIC)	Kristine Sorensen
AGC Construction ASU Student Scholarship	Ryan Leon, Tyler Lopes, Noah Martin, Samuel Schlinger
Amy and Kent Geiser Honorary Scholarship	Lisa Dietrich
Andrew Hanneman Scholarship	Blaize Gorman, Hannah Patterson
Argyro Lalos Tribute Scholarship	Jose Gamez Garcia
Arizona Society of Civil Engineers (AzSCE) Scholarship	Quinn Beauparlant, Ryan Olson
ASAP-METS Scholarship Fall 2017	Aidan Bjelland, Charles Cederstrom, Sheridan Davis, Andrew Sullivan
Associated Minority Contractors Association (AMCA) NAMU Scholarship	Alexandra Peralta
Bechtel Construction Scholarship	Alexis Butscher, Abraham Romero
Ben C. Griggs Memorial Scholarship	Haiedar Al-Robaie
Betty Hum Graduate Assistantship	Whitney Hatfield, Brianne Arviso
Briston Veteran Advancement Scholarship	Robin Lifshitz
Carl L. and Jean Wolcott Meng Memorial Scholarship	Luis Cervantes
Carter Opportunity Scholarships	Estefany Torres
Central Arizona Society for Healthcare Engineering Scholarship	Pedro Giorge
CFMA Joseph J. Quigley Memorial Scholarship	Jesus Frausto, William Hannen
Charles and Nancy O'Bannon Scholarship for Construction	Blaize Gorman
Charles and Nancy O'Bannon Scholarship for Civil	Brandon Evans
Charles Lemon Memorial Scholarship	Crystian Rodriguez
Civil and Environmental Engineering General Scholarship	Jordan Seawright
Construction in Indian Country Native American Scholarship	Kindell Davis, Dzani Little, Ramon Littleman, Shandiin Yessilth
D. L. Withers Construction Scholarship	Christopher Klemaszewski, Ramon Littleman
Daniel and Katherine Mardian Scholarship	Estefania Trancoso
Dave Clifton Memorial and ASPE Chapter 6 Scholarship	Jacob Masica, Jesse Zwick
Del E. Webb Foundation Finance and Accounting Scholarship	Kristine Sorensen
Del E. Webb Foundation Graduate Fellowship	David Gastelum, Michael Beauregard, Mohammad Jamali, Anusree Saseendran
Del E. Webb Foundation Undergraduate Student Scholarship	Sean Godfrey, Jack Symmes, Benjamin Williams
Del E. Webb Foundation Women in Construction Scholarship	Cassidy Hunter
Del E. Webb Memorial Scholarship	William Heaton, Franklin Lee, Alexander McCoy, Miller Rowley
Del E. Webb School of Construction Scholarship (CEAS)	Brendan Carey, Sean Godfrey, Caymian Gordon, Robin Lifshitz, Cole Lucey, Jacob Masica, Sean Reilly, Jonathan Richmond, Abraham Romero, Brittany Wells
DeTommaso Endowment (NAMU)	Quinn Stokes, Marlene Tapia
Dr. Matthew W. Witczak Scholarship	Seng Hkawn
Edd and Gail Gibson M&G Leaders Scholarship	Jeffrey Hubler
Edward and Amelia Kavazanjian Endowed Fellowship	Kimberly Martin
Edwin and Kay Pulchinski Scholarship for Engineering	Julia Zimmerman
Eric and Kristina Petrie Scholarship	Sean Godfrey, Simran Johal
FNF Construction, Inc. Scholarship	Alexander McCoy, Samuel Schlinger
Frank M. Chandler Memorial Scholarship	Jonathan Richmond

James Fann Memorial Scholarship	Lizbeth Gomez, Kayla Becker
Jan Bennett Endowed Scholarship	Samantha Miller
Jan Tuma Memorial Scholarship	Emily Ford
Jason McElroy Memorial Scholarship	Simran Johal
Jerry King Scholarship	Hannah Patterson
Jim Bebout Scholarship	Sean Reilly
John G. Colton Construction Study Fund	Migle Varkalaite
L.C. Jacobson Graduate Fellowship	Steven Call, Alfredo Rivera, Kristen Hurtado, Brianne Arviso
Martin H. Rosness Memorial Scholarship	Natalie Santoro
Marvin Sheldon Memorial Scholarship	Cole Maurer
Matthew Witczak Scholarship	Miranda Desimone
Mike Kolling Memorial Scholarship-Civil Engineering	Jordan Seawright
Mike Kolling Memorial Scholarship-Construction	Christopher Klemaszewski
Opus West Construction Corporation Undergraduate Scholarship	Nicholas Baltazar
Paragon Structural Design, Inc. Scholarship	Emily Ford
PENTA Building Group Scholarship	Stettler Anderson, Tyler Jacob, Jacob Kelley
Phoenix/Scottsdale Groundwater Contamination Scholarship for Environmental Science	Theresa Lau, Andrew Buell
Pulte Home Corporation Scholarship	Tyler Lopes
R. Glen Schoeffler Scholarship	Corando Chavera
Richard E. Mettler Residential	Richard Standage
Robert H. Johnson Undergraduate Scholarship	William Heaton, Jeffrey Hubler, Benjamin Williams
Robert J. Wheeler Memorial Scholarship	Haiedar Al-Robaie, Benjamin Williams
Rod J. McMullin SRP Water Resource Scholarship	Jose Gamez Garcia, Jalen Knox
Ron Pratte Scholarship	Sean Reilly
Samuel F. Kitchell Undergraduate Leadership Award	Alexis Butscher, Hannah Patterson
Spring 17 Circ and Mets Scholars Program	Emilio Figueroa, Thomas Jensen, Estefany Torres
Stanley D. Duke Applied Science Award	Julia Zimmerman
Stephen and Therese Pisarcik Scholarship	Tyler Lopes
Structural Engineers Association of Arizona Scholarship	Quinn Beauparlant, Ryan Olson
Suntec Concrete Scholarship	Jonathan Lyle
Tempe Union High School District Scholarship	Crystian Rodriguez
Terry Bourland Memorial NAMU Scholarship	Cole Maurer, Jesus Frausto, Jack Symmes
The Beavers Heavy Construction Scholarship	Franklin Lee, Daniel Perez
Tom and JoAnn Prescott New American University Scholarship	Natalie Santoro, Julia Zimmerman
William A. Pulice Scholarship Endowment	Lizbeth Gomez

Congratulations to the above students on their achievement and a special thank you to the donors for their contributions. Total scholarships and fellowships were awarded in the amount of:

# \$311,271

## Women in Engineering – New Faculty join SSEBE



#### Anca Delgado, Assistant Professor

#### PhD, Arizona State University

Anca Delgado pursued a doctoral degree in microbiology at Arizona State University, which in turn got her connected with SSEBE Associate Professor Rosa Krajmalnik-Brown and ASU's Swette Center for Environmental Biotechnology, directed by SSEBE Professor Bruce Rittmann. Her performance in the doctoral program kept her at the Swette Center, first as a postdoctoral environmental engineering research assistant and then as an assistant research scientist.

Delgado is teaching a course in contaminant fate and transport in the environment, one of the core courses in the environmental engineering master's and doctoral programs. One focus of her research is on bioremediation of chlorinated solvents, using microorganisms that can essentially respire literally breathe in — these industrial solvents or alter them into forms that render them no longer chlorinated, toxic or carcinogenic.

Delgado is also developing a course in geoenvironmental engineering for the Fulton Schools' new undergraduate environmental engineering course. It will examine methods of soil and ground water remediation. She's also doing microorganism-based geoenvironmental remediation research through a project for the Center for Bio-mediated and Bio-inspired Geotechnics, a National Science Foundation Center led by Edward Kavazanjian in the School of Sustainable Engineering and the Built Environment.



#### Wanda Dalla Costa, Associate Professor

#### MDR, Southern California Institute of Architecture: MA, University of Calgary

Wanda Dalla Costa, AIA, LEED A.P. holds a joint position at Arizona State University between The Design School as Institute Professor, and the School of Construction as Associate Professor. In 2016 and 2017 she was the Del Webb School of Construction Eminent Scholar. She is a member of the Saddle Lake First Nation and has spent nearly 20 years working with Indigenous communities in North America.

Dalla Costa's current work focuses on reoperationalizing Indigenous ways of knowing, being and connecting in contemporary architecture education and practice. Her interests include co-design methodologies, Indigenous place-keeping and climatic resiliency based in regional architectures. Dalla Costa was the first, First Nation woman to become an architect in Canada, and is part of a team of Indigenous architects representing Canada at the 2018 Venice Biennale.

Dalla Costa's teaching at ASU includes Indigenous Planning, Architecture and Construction and a multidisciplinary Indigenous Construction Studio, where architecture, construction and planning students work directly with tribal communities.

Dalla Costa holds a Master of Design Research (City Design) from the Southern California Institute of Architecture (SCI-Arc) and a Master of Architecture from the University of Calgary.

## Women in Engineering – New Faculty join SSEBE



#### Celina Dozier, Lecturer PhD, The University of Texas at Austin

Celina Dozier joined the School of Sustainable Engineering and the Built Environment (SSEBE) at Arizona State University (ASU) as Lecturer in January 2018.

Dozier obtained her PhD in Environmental Engineering from the University of Texas at Austin in 2016. She also holds an MS in Environmental Engineering from the University of California, Berkeley (2008), and a BS in Chemical Engineering from Florida Agricultural and Mechanical University (2007).

Before joining SSEBE, Dozier was a post-doctoral associate at UMass-Amherst, where she was also the Administrative Coordinator for the Water Innovation Network for Sustainable Small Systems (WINSSS). While at UMass- Amherst, she worked in a variety of areas, including the production disinfection byproducts (DBPs) from biofilters, analysis of the release of pharmaceuticals and personal care products from urine compost, and the monitoring of water quality and DBP formation potential of a local river.

Dozier is the recipient of the National Science Foundation Graduate Research Fellowship and the Graduate Student Teaching Award at UT-Austin. While at SSEBE, she will be teaching Introduction to Environmental Engineering and Environmental Engineering Mechanics. She is also interested in engineering education for grades K-12.



Margaret Garcia, Assistant Professor

#### PhD, Tufts University

Upon graduating from Tufts University with her doctorate in Civil and Environmental Engineering, Margaret Garcia was looking for somewhere to tackle the vital, pressing issues in her field of water resources engineering.

To do so, she believed an interdisciplinary approach was necessary, and she saw ASU was the place to be.

Garcia's research investigates the factors influencing the sustainability and resilience of urban water supply systems by advancing the theory of coupled systems, translating theory into actionable models, and applying these models to support infrastructure planning and policy analysis.

Her recent research projects include linking water demand projections to policy choices, assessing the sensitivity of supply models to demand assumptions, and evaluating tradeoffs between robust and flexible approaches to infrastructure design. She is in the process of building a research group that will tackle these and other issues at the intersection of hydrological, infrastructure and social systems.

After completing her undergraduate degree, Garcia spent four years working as a civil engineer for the consulting firm Arup. At Arup, Garcia worked on the planning, design and construction administration of infrastructure projects in the U.S. and abroad.



### Rebecca Muenich, Assistant Professor

#### PhD, Purdue University

Rebecca Muenich's path to becoming an engineer required her to first realize what an engineer is.

"Coming from a smaller place than most, until high school I thought engineers were just people driving trains," Muenich says. "It finally took seeing and hearing a female engineer talking about her experience as an engineer to spark my interest. What keeps me interested is the opportunities that engineering provides in terms of working on complex, interconnected, and interdisciplinary problems."

"I wanted to work on helping people reduce their impacts on ecosystems while maintaining economic productivity, says Muenich. "My current research is focused on evaluating the impacts of land management decisions within the context of the food-energy-water nexus."

Muenich, who earned a doctoral degree in agricultural biological engineering at Purdue University and worked as a postdoc at the Graham Sustainability Institute at the University of Michigan, was drawn to ASU due in part to the inclusivity statement that is a part of the ASU charter.

As an assistant professor in the School of Sustainable Engineering and the Built Environment, she's teaching a Geographic Information Systems class for graduate students and will teach an undergraduate class on engineering mechanics in the spring.

## Looking at war, technology and identity from a moral perspective



Professor Brad Allenby is a co-chair of ASU's new Moral Injury Initiative. He joined colleagues in presenting the project's goals at a recent conference that brought together researchers, military officials and public policy think tank leaders in Washington, D.C. Photograph courtesy of New America.

**Brad Allenby** has collaborated on various endeavors to comprehend the broad societal impacts of our use of powerful new technologies as military weaponry. Now he has a role in an effort to probe into a more personal toll that battlefield experiences can take on the human condition.

An Arizona State University President's Professor of civil, environmental and sustainable engineering in ASU's School of Sustainable Engineering and the Built Environment, Allenby is also a Professor of Engineering and Ethics in ASU's Lincoln Center for Applied Ethics.

Allenby has joined a group of colleagues to delve into a different kind of challenge stemming from an effect of warfare that has been described as "moral injury."

#### **Unraveling Of One's Self-Image**

Allenby is co-chair of the recently established Moral Injury Initiative, led by the **Center on the Future of War**, a joint venture of ASU and **New America**, a nonpartisan public policy think tank.

The initiative's project focuses on the study of the long-term debilitating psychological distress resulting from trauma triggered "when one's sense of personal honor and even identity are tainted by the extreme hostilities and atrocities of war," Allenby explains.

"You go into the military with a particular set of ethical values, but those values can get tested and shaken" when you are caught up in prolonged, intense and chaotic battlefield environments, he says. "When you're in the midst of the violence and chaos of modern combat, when you have to shoot at armed children that enemy forces have recruited as fighters, these things can dramatically unravel your image of yourself as a moral person," he says.

## Looking at war, technology and identity from a moral perspective



#### **Beyond The Studies To Begin Developing Treatment**

That condition was given its definition in the best-selling 2016 book *What Have We Done: The Moral Injury of Our Longest Wars*, authored by David Wood, who is now a Senior Fellow with the Center on the Future of War at New America.

Allenby, a U.S. Army veteran, was in Washington, D.C. in November with Wood, along with leaders of the ASU center, the think tank and military officials, chairing a conference titled *Moral Injury: Toward an International Perspective*.

The event spotlighted the release of a report with the same title, edited by Allenby and others, and provided the opportunity for a public statement about the goals of the Moral Injury Initiative, which also involves scholars and researchers at King's College in England and the University of New South Wales in Australia.

"We want to lay the groundwork for understanding moral injury in a systematic way across different cultures and as part of a broader insight into human psychology and identity," Allenby says.

Out of that work, the hope is to "take it beyond the studies and to generate ideas for preventing moral injury and helping the people it is impacting to overcome it," he adds.

#### **Moral Injury Reflects Broader Societal Pressures**

Like post-traumatic stress disorder that afflicts many military combat veterans, moral injury affects not just soldiers but their families and communities. Allenby and his collaborators see their project as part of a broader humanitarian mission.

Moral injury "is one of many related things that are coalescing to shape us," says Allenby.

He points out how new technologies and their increasing capabilities are altering our outlooks and behaviors and relationships to each other on a global scale, in both positive and negative ways.

From that perspective, the study of moral injury fits in with his longtime efforts to understand the social and ethical implications of our uses of science and engineering.

Today, Allenby says, our pervasive and rapidly advancing technologies — whether they are used in actual armed conflict or in cyberspace or social media — "can put us into a kind of battlespace," where both our personal and communal identities can be challenged and sometimes undermined and even demoralized.



# **Roads to discovery: ASU researchers tackle the future of transportation**

Roughly 40 percent of the nation's roads and major highways are not considered to be in good condition, and about 70,000 of U.S. bridges are structurally deficient. Beyond rebuilding today's infrastructure, we may want to ask ourselves what tomorrow's roads, bridges and automobile alternatives might look like, and how we can prepare for coming change. What technological advances should we take into consideration? Will autonomous vehicles go mainstream soon? What materials are best from sustainability and longevity standpoints?

Here's a look at ASU's role in answering the nation's biggest transportation questions.

#### **Materials**

When it comes to crumbling roads and bridges, advances in materials are key to getting the greatest long-term bang for today's transportation buck. **Narayanan Neithalath**, professor of structural engineering and materials in the School of Sustainable Engineering and the Built Environment has been grappling with materials dilemmas for years. He appears to have found some solutions. Concrete used for today's roads and bridges easily cracks with temperature shifts. With cracking comes considerable repair work, and in areas where roads are salted during the winter, the steel underneath the concrete surface can corrode without notice. "You may not even see the crack on the surface. You see signs of corrosion only after it has progressed quite extensively," Neithalath says.

In collaboration with researchers at UCLA and in Europe, Neithalath has experimented with a waxlike material mixed into concrete that allows the concrete to better expand and contract and handle temperature fluctuations without cracking. His team also experiments with new materials to reduce the amount of Portland cement - the most common type of cement in general use around the world – needed in concrete. The production of a ton of Portland cement results in the emission of about a ton of carbon dioxide, Neithalath explains.



Narayanan Neithalath, Professor, SSEBE

#### **Predicting transportation needs**



Ram Pendyala, Professor, SSEBE

Understanding current and future traffic patterns is key to prioritizing transportation investment. Figuring out how we use transportation resources today and considering how we may use them in the future, is a complex game **Ram Pendyala**, professor of transportation systems, is at the center of these tradeoffs.

Pendyala and his research team have worked on transportation-demand forecasting models for the New York Metropolitan Transportation Council, Colorado Department of Transportation, Maricopa Association of Governments and other agencies.

Their models attempt to account for all transportation circumstances and needs, factoring in driving patterns, mass transit use, demographics, economics, rider and driver profiles and emerging technologies, while also considering the potential for future changes.

"Literally, we try to simulate a day in the life of every person in the Valley, says Pendyala, "so we can get a handle on hot spots, congestion points, sources of bottlenecks and the strategies we can adopt to mitigate congestion without spending a fortune on transportation improvements."

Pendyala is also the director of **ASU's Tier 1 transportation center, one of** only 20 in the country sponsored by the U.S. Department of Transportation. Called Teaching Old **Models New Tricks (TOMNET),** its goal is to develop systems and technologies to provide better surface transportation and mobility.

#### Electric and autonomous vehicles

A second core area of study for Pendyala's team is understanding how electric and autonomous vehicles will impact transportation systems.

"There are a lot of unknowns as to how these technologies are going to disrupt transportation systems and networks," he says.

Currently, battery storage and the short range for electric vehicles is a deterrent slowing their expansion, Pendyala adds, but if these technological solutions surface soon, infrastructure may need to play catch-up.

#### Beyond cars, the environment



Mikhail Chester, Associate Professor, SSEBE

**Mikhail Chester**, associate professor of transportation infrastructure, studies life cycle assessment of transportation systems, including vehicles, infrastructures and fuels. When looking at the environmental impact of travel, the emphasis tends to be on the tailpipe, he says, but there is so much more involved. Massive supply chains and infrastructure are needed to operate one car.

"When we include all of those components, we see that the footprint of a transportation mode is significantly larger than just the tailpipe," he says.

Chester also analyzes metro-area transportation infrastructures. Phoenix, he explains, has a relatively young and extremely auto-centric transportation infrastructure. As much as he would like to encourage less automobile use, some modes of transportation struggle for viability, given the configuration of the city.

With the automobile still largely driving infrastructure decisions and urban form, it's important to consider the future when making transportation decisions.



Peter Fox Professor and Graduate Chair

## Climate change needs a solution, not a debate

Environmental engineering solutions to climate change can be created at ASU



Climate change should not be deniable, yet there is still debate about its existence. Even within communities that do accept climate change, people still argue about the extent of human involvement.

The issue is that the longer the debate ensues, the worse the conditions will get.

ASU's sustainability programs are researching causes and solutions to this problem, which would not only lead to a positive impact on campus but also on a much larger scale.

In the past year alone, there has been a dramatic increase in not only the frequency but also the deadliness and economic burden of natural disasters around the world. The increase is often attributed to climate change.

#### Peter Fox, a professor at ASU's School of Sustainable Engineering and the Built Environment, said that it is hard to deny human involvement in climate change.

"We're all responsible," Fox said. "I don't think the debate is really over the science anymore, it's more about the ideology. If I tell you you're responsible for this and you need to change the way you're acting, then certain people tend to get quite upset ... but the fact that we had three Category 4 or 5 hurricanes in one year, one of which was the strongest ever recorded ... it's hard to sit back and say 'oh well, it's just an anomaly."

Regardless of whether this change in the environment was anthropogenic, it is abundantly clear that it is no longer the time to debate the source, but rather look for solutions instead.

One environmental issue stemming from human involvement comes from the inefficient use of energy.

About 85 percent of the total energy used worldwide comes from the burning of fossil fuels and constitutes 80 percent of the greenhouse gas emitted by human activities. Not only are fossil fuels nonrenewable, but they also contribute to global warming.

Many initiatives are being taken by professors and researchers at ASU, many of which involve the use of wastewater as a source of energy.

"Our goal nowadays is not to treat the water and make sure it's okay to release into the environment, but to try and actually recover energy from the wastewater," Fox said.

ASU as a campus has also taken initiative to be sustainable.

"I think the solar power use here is tremendous, compared to most other places and universities I've seen," Fox said. "They've invested so much on the solar power side of things. I personally am on the university's water sustainability committee, and we've done a good job — even though we've had tremendous growth on campus over the last 15 years, the water demand has been pretty flat."

ASU is also committed to producing zero waste across all their campuses and also advocates for sustainable public transportation.

Given the changing environment, it is important to take initiative rather than focusing on the political aspects of the debate.





## ASU study shows effect of climate change on food, energy and water across Southwest

#### **Disruptions in Arizona would have ripple effects** throughout the supply chain for several major US cities

An Arizona State University study on Arizona agriculture shows the potential effect of a warming planet on the state and the region by examining the food-energy-water nexus.

Disruptions from temperature increases could drop crop yields, require more irrigation and cause ripples, including increased food prices, throughout the Southwest, according to the paper from **Mikhail Chester** of the School of Sustainable Engineering and the Built Environment and **Andrew Berardy** of the Julie Ann Wrigley Global Institute of Sustainability at ASU.

For major Arizona crops, according to Chester and Berardy's research, yields could drop more than 12 percent per 1 degree Celsius. It also could require increased irrigation of about 2 percent per degree, according to the study.

Disruptions would be felt locally and across the Southwest, including California, Nevada and Texas, affecting food supply chains to several major U.S. cities, the research shows.

Shocks and strains on energy and water production and their delivery systems could result in failures that cascade down to food systems. Failures in one system could easily spread to another.

Chester and Berardy analyzed public data that show different modes of freight and what types of goods are going across state lines. They also studied the threshold temperatures of crops, U.S. Department of Agriculture and U.S. Geological Survey data, Arizona crop budgets and region-specific literature. It's going to be more complicated than just the price of food skyrocketing. Land used for fodder production, like alfalfa, might be shifted to other crops.

"The shifts are going to be felt first in livestock, in the price of meat and dairy, because the effect of the temperature increase will be felt there first," Berardy said. "If these impacts are happening in Arizona, they're going to be found in other states, too. That will have a compounding effect."



Mikhail Chester, Associate Professor, SSEBE

Their research recommends the farmers switch to more efficient irrigation methods, like drip irrigation. Smaller farms might not be able to afford a switch to drip irrigation. Larger farms might already have a pricey sprinkler system in place they don't want to replace. Only about half of Arizona farms with flood-irrigation systems engage in any kind of water conservation, according to the study.

"You can change any one component of it, and it has cascading effects downstream," Berardy said. "No matter what you change, it's going to change something else too."



## **ASU** scientist scores major victory with FDA

Starting at the beginning of last September, the Food and Drug Administration prohibited the sale of personal-care products containing prominent antimicrobials, including triclosan and triclocarban – prized for their antimicrobial properties. The ban is a direct result of **Rolf Halden's** research which started in 2002.

"I want to rattle people's cages to make them aware of what's happening in our world," said Halden, director of ASU's Biodesign Center for Environmental Health Engineering and the lead author of the *Florence Statement*, a declaration signed by more than 200 scientists and medical professionals that laid out a convincing case against why these two antimicrobials are harmful.

Halden is a professor in the School of Sustainable Engineering and the Built Environment and a senior sustainability scientist in the Global Institute of Sustainability. He has long contended triclosan and triclocarban are often ineffective in safeguarding the public from harmful microbes and, further, post significant risks to human health and the environment by contaminating air, soil and water.

The FDA's ruling only applies to consumer hand washes and soaps. The restriction does not extend to building and household products that are outside the purview of the FDA but still contain hazardous and ineffective antimicrobials sold throughout the U.S. and worldwide. Still, the FDA's ruling is a major victory for consumers.





## Center for Bio-mediated and Bio-inspired Geotechnics (CBBG), a National Science Foundation (NSF) 3<sup>rd</sup> Generation (Gen-3) Engineering Research Center (ERC)

## CBBG researchers work to improve sands and other granular soils by precipitating calcium carbonate (CaCO<sub>2</sub>)

SSEBE is home to the Center for Bio-mediated and Bioinspired Geotechnics (CBBG), a National Science Foundation (NSF) 3<sup>rd</sup> Generation (Gen-3) Engineering Research Center (ERC). CBBG, now in the middle of its third year of operations, was funded with \$18.5 million by NSF for an initial period of 5 years and is eligible for a second 5-year funding increment. Along with partner Universities Georgia Institute of Technology, New Mexico State University, and the University of California at Davis, CBBG seeks to create a new sub-discipline in the geotechnical engineering field sometimes referred to as biogeotechnical engineering. The premise of biogeotechnical engineering is that we can learn from nature how to create sustainable and resilient geotechnical systems. As a Gen-3 NSF ERC, CBBG is tasked with collaborating with industry to use the lessons to develop licensable and marketable technologies for civil infrastructure construction.



One of the biogeotechnical challenges currently being addressed

by ASU CBBG researchers is the improvement of sands and other granular soils by precipitating calcium carbonate (CaCO<sub>3</sub>). The ASU researchers are attempting to do this by two different approaches. One approach attempts to accelerate natural processes that operate on a geological time scale like the formation of carbonate cemented sand deposits so that they occur in a time frame of engineering interest. The second approach seeks to harness processes that occur on an engineering time scale but in an adverse context like the formation of mineral scale on pipes and the clogging of treatment plant filters and well screens. Potential applications of these technologies include mitigation of earthquake-induced soil liquefaction, mitigation of fugitive dust, enhancement of the bearing capacity of shallow foundations, and stabilization of tunnel headings in running or flowing ground.

ASU has supported CBBG by renovation of space in the Goldwater building to serve as its headquarters, renovating laboratory space in Engineering Center Wings C and D to create a state of the art laboratory for the study of subsurface microbiological processes, and construction of a field test site on the Polytechnic campus. The Polytechnic campus field test site includes a large (20 ft x 8 ft x 12 ft deep) test pit and an ASTM-compliant rainfall simulator with a 40 ft x 8 ft x 1.5 ft deep soil test bed for field scale testing of CBBG biogeotechnologies.

The ASU CBBG team is led by **Center Director Regents Professor Ed Kavazanjian and includes co-Principal Investigator Professor Rosa Krajmalnik-Brown, Deputy Director Professor Claudia Zapata, and Industrial Liaison Officer Research Professor Nasser Hamdan**. Other SSEBE personnel



who serve as Senior Investigators on CBBG projects include **Professors Bruce Rittmann, Leon van Paassen, Treavor Boyer, and Anca Delgado**. The CBBG team is rounded out by Administrative Director Regina Sanborn, Project Coordinator Michelle Walker, and Education Coordinator Jean Larson. CBBG industry partners include major facility owners (Chevron, Freeport McMoRan, Republic Services, Salt River Landfill), ground improvement contractors (Biocement, GeoPier, Hayward Baker, Nicholson Construction, and Schnabel Construction, engineering architecture design firms (Arcadis, WSP) geotechnical/geoenvironmental consulting firms (Geosyntec, Golder), specialty firms (Phoenix Services), and public agencies (ADOT, ADEQ).

# Water conservation, resource recovery, and pollutant removal all from urine diversion

Restrooms can account for 30% to 50% of the water used in buildings with the majority of restroom-water-use for flushing urinals and toilets. Replacing flush urinals with nonwater urinals can substantially reduce building-water-use by eliminating flushing. This is well-known by architects and designers, and by companies in the plumbing and sanitary fixtures industry with a variety of models of nonwater urinals available. What is surprising, however, is that water conservation is only one of many benefits that can be realized by installing nonwater urinals as part of a building-scale urine diversion system. For instance, collecting and processing undiluted urine from nonwater urinals can create a local and sustainable supply of fertilizer, can sequester pharmaceuticals and hormones and thereby prevent their release to the environment, and can decrease the energy used for municipal wastewater treatment and therefore reduce the cost of operating a wastewater treatment plant.

The benefits of nonwater urinals as part of a building-scale urine collection system are possible because urine is a small volume and highly concentrated solution containing nutrients, salt ions, endogeneous metabolites, and trace organic chemicals. For example, urine contributes approximately 1% to the total volume of liquid entering a wastewater treatment plant yet it contributes over 90% of the mass of nitrogen entering a wastewater treatment plant. Because one of the main functions of a wastewater treatment plant is to remove nitrogen, the size of the wastewater treatment plant must handle urine (1% by volume) plus the remaining 99% of liquid that is mostly greywater. In terms of benefits to society, urine contains nitrogen, phosphorus, and potassium, which are all essential nutrients for plant growth. Urine, however, also contains salts and organic chemicals such as pharmaceuticals. Therefore, processes are needed to recover beneficial products from urine (e.g., nitrogen and phosphorus fertilizers) while eliminating contaminants.



Treavor Boyer, associate professor

Treavor Boyer, an associate professor of environmental engineering in the School of Sustainable Engineering and the Built environment, has a comprehensive research program on urine diversion, which spans collection, storage, and treatment of urine in buildings to produce beneficial products and improve society. This starts with nonwater urinals that are piped to storage tanks in a building instead of the sewer. The use of nonwater urinals also ensures that the urine is not diluted with flush water, which minimizes the volume required for storage and benefits subsequent processing. The challenge, however, is that undiluted urine has favorable conditions for precipitation, odors, and microbiological growth. Daniella Saetta, secondyear environmental engineering doctoral student at ASU, is investigating how urine composition changes in nonwater urinals and how to manipulate urine chemistry to benefit subsequent nutrient recovery and pharmaceutical removal steps (see photo). This leads to **Hannah Ray**, second-year environmental engineering doctoral student at ASU, and **Neha Jagtap**, third-year environmental engineering doctoral student visiting from the University of Florida (UF), investigating novel approaches to nutrient recovery from urine such as urea and tailored fertilizer products. Finally, Avni Solanki, fourth-year environmental engineering doctoral student visiting from UF, is investigating biochar for adsorption of pharmaceuticals in urine to ensure a contaminant-free product. Together, the work by Boyer and his doctoral students on urine diversion is a game-changer for society where flush urinals can be replaced with nonwater urinals to conserve water, and also recover beneficial products, sequester pollutants, and benefit the operation of water and wastewater systems.





## Alumni

## Tradition Revived: Honoring Outstanding Contributors to Construction and Civil Engineering

On February 3, 2017, the School of Sustainable Engineering and the Built Environment hosted the School's first awards ceremony and dinner.

In his opening remarks, G. Edward Gibson, the school's director, called the event "a new tradition for civil engineering and a restart of a Del E. Webb School of Construction tradition."

The School of Construction has been recognizing distinguished alumni since 1995, and is now housed in the School of Sustainable Engineering and the Built Environment – starting a new joint tradition.

The ceremony named five alumni exemplars for induction into the Academy of Distinguished Alumni and inducted two outstanding contributors to the school into the Hall of Fame.

Congratulations to the 2017 Academy of Distinguished Alumni and Hall of Fame inductees!



Stephen Basila ('77 B.S. Construction) AGC Arizona Chapter chairman and lifetime director; owner and manager of Infrastructure Mavens LLC was recognized for his integral efforts in establishing the AGC Endowed Lecturer position within the Del E. Webb School of Construction.



Kent Dibble, P.E., ('75 B.S. Civil Engineering) President, Dibble Engineering, was recognized for his quality of work, integrity and support of engineering education. He provided leadership on the Industry Advisory Board and the Friends of Civil Engineering (FOCE).

## 2017 Academy of Distinguished Alumni



Michael Fann ('80 B.S. Construction) President, Fann Contracting is a multigeneration contractor that has established a scholarship for construction students. He continues to help recruit students from Northern Arizona.



Enamul Hoque, P.E. ('85 M.S., Civil Engineering) President & CEO of Hoque & Associates, Inc. has contributed to the civil engineering soil research labs and to other outreach programs in the Fulton Schools of Engineering.



Hisham Mahmoud, PhD, P.E. ('89 M.S. Civil Engineering and '91 PhD Civil Engineering) President and CEO of Golder Associates established himself as a global leader in the field of civil engineering.



#### 2017 Hall of Fame

Eric Hedlund, C.P.C., P.E., Senior Vice President and District Manager for Sundt Construction's Texas offices

> Paul Johnson, PhD. Served as dean of the Fulton Schools from 2011 to 2015 before accepting his current position as President of the Colorado School of Mines. He is an emeritus faculty member in the School of Sustainable Engineering and the Built Environment



## Alumni

### ENR Southwest's 2017 Top Young Professionals: Top 20 Under 40

## Excellent work skills along with a dedication to the community were common themes that resonated with this year's judges

**Chase Farnsworth's** interest in buildings developed at an early age when he began learning carpentry in middle school. Today, he is project development manager for Mortenson Construction.

## The Arizona State University alumnus graduated magna cum laude with a bachelor's degree in construction management.

Farnsworth began at Mortenson as an assistant project manager on the SRP design phase, followed by multiple projects for AlaskaUSA Federal Credit Union. Farnsworth now focuses on expanding the water/wastewater market in Arizona.

Farnsworth strives to make a positive impact on his community and volunteers at many local organizations such as Feed My Starving Children and Junior Achievement. Farnsworth is a member of the Golden Key International Honour Society and Sigma Lambda Chi International Honor Construction Society. *(ENR Southwest)* 



#### **ITE Edmund R. Ricker Award**

Sanjay Paul, a recent alumni of the School of Sustainable Engineering and the Built Environment, received the 2016 Institute of Transportation Engineers (ITE) Transportation Safety Council Edmund R. Ricker Award. The individual award is given to a person who is recognized as a leader in the field of traffic safety through his/her safety activities in professional organizations, in the community, or in the performance of traffic engineering.



#### Phoenix Business Journal "40 Under 40" Award

In June 2017, **Dr. Ali Fakih**, Principle of Sustainability Engineering Group, LLC (SEG) completed his PhD work in the School of Sustainable Engineering and the Built Environment at ASU. His dissertation focused on "Saline Waste Use for Subgrade Soil Improvement" and faculty committee consisted of Drs. Kamil Kaloush, Claudia Zapata and Peter Fox. During Ali's challenging academic schedule at ASU, he ran a successful business. SEG remarkably grew over the years because of Ali's leadership, excellent mentoring of the young engineers he hired, and dedication to excellence. Over the years, Ali presented at several local conferences and talked about his work at SEG and ASU. His message has been consistent: he wants to improve our quality of life and infrastructure with a sustainable approach. He is truly passionate about his message and mission.

Ali has been recognized as one of the **"40 Under 40" Awardees by the Phoenix Business Journa**l. The honorees are recognized for their accomplishments that greatly impact the Phoenix Metropolitan Area.

### **Industry Engagement**



The **Sigma Lambda Chi International Construction Honor Society (SLC)** at Arizona State University maintains a strong program to support the Construction education and, above all, our next generation of builders. They recognize that they are not alone in this endeavor and owe much of our success to the generous support of our industry sponsors.

With the support of **Steve Grauer, Vice President and District Manager of Hensel Phelps**, one of the largest general contractors and construction managers in the United States as ranked by Engineering News Record (ENR), SSEBE and SLC have gifted over 100 hard hats for construction graduates in 2016 and 2017. Hard hats are the symbol of the construction industry and worn by construction students at graduation. They represent safety, protection and responsibility. These donated hard hats remind the students about their education, and give them an opportunity to join the industry with confidence.



Nguyen Le *(Left)* and Trey Tan *(Right)* representing SSEBE and SLC to acknowledge Hensel Phelps Phoenix office Project Development Director Anthony Jeffers *(Middle)* for the hard hat sponsorship



Friends of Civil Engineering talk with students at the annual FOCE Industry/Student Mixer

#### Environmental Engineering (EVE) Program

Damann Anderson, Vice President, Hazen and Sawyer Maria Brady, Principal, AZ Water Sector Leader, Stantec Zaid Chowdhury, Water Technology Director, Garver Kirk Craig, Senior Principal Engineer, Geosyntec Consultants Daniel Gleiberman, Manager Product Compliance and Government Affairs, Sloan Valve Co.

**Charlie He,** Associate Vice President, Carollo Engineers **Brandy Kelso,** Water Services Assistant Director, City of Phoenix

**Mike Krebs,** *Vice President, Environmental Water Division*, PACE, Advanced Water Engineering

**Laurie LaPat-Polasko,** *Vice President, National Director of Remediation,* Matrix New World Engineering,

**Craig McCurry,** *Senior Environmental Engineer*, Intel Corporation **Elaine H. Wilson,** National Tribal Air Association **Mike Worlton,** *Principal (Vice President)*, GHD

#### Construction Engineering Industry Advisory Board

**Dave Sobeck,** *Vice President*, Carollo Engineers, Inc. **Steve Morensen**, *CEO & Chairman of the Board*, Project Engineering Consultants

Keith London, President/CEO, Kennedy/Jenks Consultants Darrin Francom, Engineering Manager, Central Arizona Project Scot Schlund, Managing Senior Principal, Stantec Consulting Jeff Williamson, Division Manager-Heavy Civil, Sundt Construction, Inc.

Kenneth Morgan, President, KCM Consulting Services Paul Menne, Manager of Projects, Burns & McDonnell Mike Kemper, Vice President, Quanta Services Willie Paiz, Regional Operations Manager, CH2M Hill John Mistler, Executive Vice President, First Fidelity Bank

#### Friends of Civil Engineering (FOCE)

#### **Black & Veatch Corporation**

Bowman Consulting Carollo Engineers CivTech Inc. Coe & Van Loo Consultants, Inc. Dibble Engineering Entellus, Inc. Gannett Fleming GHD, Inc. HilgartWilson, LLC Kimley-Horn & Associates Markham Contracting Co., Inc. Michael Baker International, Inc. Prelude Engineering Consultant Services T & S Diversified Westland Resources, Inc. Wood, Patel & Associates Government Members: Arizona Department of Transportation, City of Glendale

#### Civil, Environmental & Sustainable Engineering

**Dan Meyer,** Senior Vice President, Black & Veatch **Jonathan Fuller,** Principal, JE Fuller Hydrology & Geomorphology, Inc.

Jennifer Toth, Transportation Director, County Engineer, MCDOT Paul Burch, Acting State Materials Engineer, ADOT

**Chris Kmetty,** Construction Engineering Manager, Markham Contracting Co., Inc.

Les Olson, Coe & Van Loo Consultants (Retired) Willie Paiz, Regional Operations Manager, Construction Management Services, CH2M Hill

Kent Dibble, Principal, Dibble Engineering

Bruce P. Larson, *Principal/Sr. Project Manager*, Westland Resources, Inc.

Jim Geiser, Principal, Prelude Engineering Consultant Services Andrew Johnson, Supervisor Performance Monitoring Center, Salt River Project

Eric Laurin, Associate Director, Coe & Van Loo Consultants, Inc. Gregory Haggerty, Chief Executive Officer, Dibble Engineering Frederick H. Tack, ASCE Phoenix Branch President, GHD

#### **DEWSC IAC Executive Board**

IAC Chair - Anthony Jeffers, Project Manager, Hensel Phelps

Ryan Abbott, Senior Vice President, Sundt Construction Lorraine Bergman, President/CEO, Caliente Construction Maria Brady, Principal – Transportation, Stantec Jeff Ehret, President, The PENTA Building Group Danielle Feroleto, Principal/Owner, Small Giants Kevin Fisher, Sunland Asphalt

Dallas Hammit, State Engineering & Deputy Director, ADOT Betty Irish, Faculty, Arizona State University

Kini Knudson, City Engineering & Asst Director Street Transportation, City of Phoenix

Steve McClain, CEO, Strategic Solar Energy, LLC – PowerParasol

**Tom Melton,** *Director of Field Operations*, JE Dunn Construction

James Murphy, President, Willmeng Construction Chris Nickle, Sr. VP, McCarthy Building Companies Bill Okland, President, Okland Construction Steve Padilla, CEO, Hunter Contracting Bob Roessel, Executive Principal, SRP Bob Smith, VP for Business Affairs, University of Arizona Gene VanWagner, District Manager, Kiewit Infrastructure

## Morteza Abbaszadegan



#### Professor PhD, University of Arizona

**Expertise:** Health-related water microbiology, microbial detection, pathogens inactivation and removal technologies



President's Professor PhD, Rutgers University

**Expertise:** Industrial ecology, sustainable engineering, emerging technologies, weaponized narrative

## Absar Alum



#### Assistant Research Professor

PhD, University of Arizona

**Expertise:** Environmental Microbiology, Environmental Toxicology, Rapid detection Methods/Biosensor, Control of microbial contaminants, Fate and transport of pathogens

## Samuel Ariaratnam



#### Professor and Construction Engineering Program Chair

PhD, University of Illinois at Urbana-Champaign

**Expertise:** Underground Infrastructure Management & Rehabilitation, Trenchless Construction Methods, Urban Utility Systems

## Steven Ayer



Assistant Professor PhD, The Pennsylvania State University

**Expertise:** Building Information Modeling (BIM); Mixed- and Virtual-Reality for Education

## Wylie Bearup



Professor of Practice

PhD, University of Illinois

**Expertise:** Public owner construction processes, public finance, alternate project delivery methods

## Treavor Boyer



#### Associate Professor and Environmental Engineering Program Chair

PhD, University of North Carolina at Chapel Hill

**Expertise:** Physical-chemical processes applied to drinking water and wastewater treatment

## Efthalia Chatziefstratiou



#### Lecturer

PhD, The Ohio State University

**Expertise:** Engaged student learning/active learning, Structural Engineering, Environmental Sciences

## Mikhail Chester



#### Associate Professor

PhD, University of California, Berkeley

**Expertise:** Sustainable and resilient infrastructure; climate adaptation; life-cycle assessment

♦ 2017 Fulton Faculty Exemplar

## Oswald Chong



Associate Professor PhD, University of Texas at Austin

**Expertise**: Energy modeling and degradation, information technology and systems, project management systems, heavy infrastructure systems





MS, DePaul University

**Expertise:** Heavy/civil concentration for the DEWSC Construction Management degree program

## Otakuye Conroy-Ben



Assistant Professor PhD, University of Arizona

**Expertise:** Metal/multidrug efflux in bacteria, endocrine disruption bioassays, organic micropollutants

## Paul Dahlen



Assistant Research Professor

PhD, Arizona State University

**Expertise:** Petroleum/ chlorinated hydrocarbon contaminant fate and transport in the environment

## Wanda Dalla Costa



**Associate Professor** 

MA, University of Calgary, MDR, Southern California Institute of Architecture

**Expertise:** Indigenous architecture, planning and placekeeping; community engagement; sustainable design

#### New faculty

## Anca Delgado



Assistant Professor PhD, Arizona State University

**Expertise:** Soil microbial processes, bioremediation, microbial kinetics, bioreactors, analytical chemistry

New faculty

## Thomas Dempster



Associate Research Professor

PhD, Arizona State University

**Expertise:** Phycology; algal taxonomy and physiology; large scale cultivation of microalgae for biofuels and high value products

## Celina Dozier



Lecturer PhD, The University of Texas at Austin

**Expertise:** Computer Methods, Fluid Mechanics, Environmental Sampling and Analysis Lab

New faculty

## Mounir El Asmar



Assistant Professor PhD, University of Wisconsin-Madison

**Expertise:** Construction, Innovative project delivery methods, Performance, Decision making, Sustainable construction



Associate Professor PhD, University of Texas at Austin

**Expertise:** Concrete materials and concrete construction operations; Project Delivery Methods

## Peter Fox



Professor and Graduate Chair

PhD, University of Illinois

**Expertise:** Water reuse, biological treatment processes and brine disposal/ desalination

## Andrew Fraser



Assistant Research Professor

PhD, Arizona State University

**Expertise:** Climate change mitigation and infrastructure adaptations to foster system resilience

## Matthew Fraser



Professor PhD, Caltech

**Expertise:** Urban air quality, environmental impacts of energy production

## Margaret Garcia



Assistant Professor PhD, Tufts University

**Expertise:** Water system sustainability and resilience, systems analysis, sociotechnical systems

#### New faculty

## Sergio Garcia-Segura



#### Assistant Research Professor

PhD, University of Barcelona, Spain

**Expertise:** Development of electrochemical and photoelectrochemical water treatment technologies

New faculty

## G. Edward Gibson, Jr.



## School Director, Professor and Sunstate Chair

PhD, Auburn University

**Expertise:** Front end planning, risk management, engineering education, dispute resolution





Assistant Professor PhD, The University of Texas at Austin

**Expertise:** Lean construction, systems engineering, sensing and information technologies, project controls

## Yuanming Guo



#### Assistant Research Professor

PhD, Arizona State University

**Expertise:** Health risk assessment, Subsurface contaminant fate and transport, Soil/groundwater remediation

## Rolf <u>Halden</u>



#### Professor, Director, Center for Environmental Security

PhD, University of Minnesota

**Expertise:** Public Health Engineering, Sustainable Cities, Urban Water Cycle, Green Chemistry and Green Engineering, Urban Metabolism & Exposure Assessment

## Nasser Hamdan



Assistant Research Professor

PhD, Arizona State University

**Expertise:** Biogeotechnics, Biogeochemistry, Geomicrobial Processes, Soil Treatment and Stabilization

#### New faculty

## Keith Hjelmstad



**Professor and CESE Program Chair** PhD, University of California,

Berkeley

**Expertise:** Structural engineering, computational mechanics, engineering education

## Christian Hoover



Assistant Professor PhD, Northwestern University

**Expertise:** Fracture and multi scale experimental mechanics of porous materials

## Sandra Houston



Professor

PhD, University of California, Berkeley

**Expertise:** Geotechnical engineering, unsaturated soils, expansive and collapsible soils, arid region soils

## Kristen Hurtado



#### Assistant Research Professor

MS, Arizona State University

**Expertise:** Project management and planning, organizational change, sourcing, and professional training

## Kamil Kaloush



Professor, Director, National Center of Excellence on SMART Innovations

PhD, Arizona State University

**Expertise:** Pavements design, laboratory testing, field performance, management, urban heat island

Top 5% Teaching Award

## Edward Kavazanjian, Jr.



Professor, Director, Center for Bio-mediated and Bioinspired Geotechnics

PhD, University of California, Berkeley

**Expertise:** Biogeotechnical engineering, geotechnical earthquake engineering, waste containment, mechanical properties of municipal solid waste

## Sara Khoeini



#### Assistant Research Professor

PhD, Georgia Institute of Technology

**Expertise:** Travel behavior analysis and demand modeling, Travel survey methods, Sustainability and energy

New faculty

## Kraig Knutson



Senior Lecturer PhD, Arizona State University

**Expertise:** Historical construction methods, infrastructure security and application of industrial engineering techniques to construction processes

## Rosa Joseph Krajmalnik-Brown Kunkel



Associate Professor PhD, Georgia Institute of Technology

**Expertise:** Microbial ecology management for bioremediation, bioenergy, and human health



Visiting Eminent Scholar MA, University of Maryland, College Park

**Expertise:** Architectural design in indigenous cultures

## Klaus Lackner



#### Professor, Director, Center for Negative Carbon Emissions

PhD, Heidelberg University, Germany

**Expertise:** Carbon sequestration, carbon footprinting, innovative energy and infrastructure systems and their scaling properties

## Anthony Lamanna



#### Associate Professor and DEWSC Program Chair

PhD, University of Wisconsin

**Expertise:** Anchorage to Concrete, Sustainable Development, Resilient Systems, Adaptive Reuse

New faculty

## Peter Lammers



**Research Professor** PhD, Portland State University

**Expertise:** Environmental engineering, microbial photosynthesis, algal biomass cultivation, bioenergy, wastewater treatment

## Christopher Lawrence



Lecturer PhD, Arizona State University

**Expertise:** Engineering mechanics, geotechnical engineering, numerical methods, and civil engineering materials

## Yingyan Lou



Assistant Professor PhD, University of Florida

**Expertise:** Transportation network modeling and analysis, optimization of multi-modal transportation networks

## Michael Mamlouk



**Professor** PhD, Purdue University

**Expertise:** Pavement Design and Management, Pavement Maintenance and Rehabilitation, and material characterization

## Bruce Marsh



**Professor of Practice** MS, Oregon State University

**Expertise:** Large complex earth system projects (Panama Canal, Dubai, Mining & Water)

## Giuseppe Mascaro



Assistant Professor PhD, University of Cagliari, Italy

**Expertise:** stochastic hydrology, climate downscaling, hydrometeorological extremes, hydrologic modeling, foodwater-energy nexus

## Larry Mays



**Professor** PhD, University of Illinois

**Expertise:** Hydrosystems, hydrology, hydraulics, sustainability, optimization, risk, reliability, planning, management, modeling

## Barzin Mobasher



#### Professor PhD, Northwestern University

**Expertise:** Mechanics of composite materials, development of new construction materials, durability of building materials





Assistant Professor PhD, Purdue University

**Expertise:** Environmental modeler focused on trade-offs within the food-energy-water nexus

New faculty

## Narayanan Neithalath



**Professor** PhD, Purdue University

**Expertise:** Science of infrastructural materials (cement and concrete), new structural materials and systems, development and modeling

## Kristen Parrish



Assistant Professor PhD, University of California, Berkeley

**Expertise:** Energy efficient buildings, and integrated planning, design, and construction

Top 5% Teaching Award

## Ram Pendyala



Professor and Associate Director, Director, TOMNET University Transportation Center

PhD, University of California at Davis

**Expertise:** Transportation Systems Engineering, activitytravel demand modeling, emerging transportation technologies/data

## Francois Perreault



Assistant Professor PhD, University of Quebec in Montreal

**Expertise:** Environmental nanotechnology, water quality, and ecotoxicology of emerging contaminants

## Subramaniam (Subby) Rajan



**Professor** PhD, University of Iowa

**Expertise:** Finite element analysis, Experimental techniques, Design optimization, Highperformance computations

## T. Agami Reddy



#### Professor

PhD, University of Perpignan, France

**Expertise:** Sustainable Energy Processes and Systems, Building Energy Efficiency, Data Analytics

## Bruce Rittmann



#### Regents Professor, Director, Swette Center for Environmental Biotechnology

PhD, Stanford University

**Expertise:** Environmental Biotechnology, managing microorganisms to enhance environmental and health sustainability

## Thomas Seager



Associate Professor PhD, Clarkson University

**Expertise:** Resilient infrastructure systems, life cycle assessment of emerging technologies, team science

## Shahnawaz Sinha



Assistant Research Professor

PhD, University of Colorado-Boulder

**Expertise:** Drinking Water Treatment, Water Quality Research, Pilot-scale Studies

## Kenneth Sullivan



Associate Professor PhD, University of Wisconsin-Madison

**Expertise:** Organizational Change, Procurement, Facilities Management, Performance Measurement, Talent Profiling & Development

## Pingbo Tang



Assistant Professor

PhD, Carnegie Mellon University

**Expertise:** Automated Spatiotemporal Data Analytics for Civil Systems Safety and Productivity

## Leon van Paassen



Associate Professor PhD, Delft University of

Technology

**Expertise:** Engineering Geology, Environmental Biotechnology, Geotechnical, Geo-Environmental and Mining Engineering, Biogeotechnical Engineering

#### New faculty



#### Professor

PhD, Massachusetts Institute of Technology

**Expertise:** Hydrologic interactions with climate, ecosystems and landscapes in arid regions

## Kristen Ward



## Lecturer

PhD, University of Arizona

**Expertise:** Structural Engineering, Engineering Mechanics, Earthquake Engineering, Numerical Methods

## Zhihua Wang



## Assistant Professor PhD, Princeton University

**Expertise:** Energy-water nexus; Hydroclimate modeling; Infrastructure design; Urban sustainability





Senior Lecturer MCE, North Carolina State University

**Expertise:** Concrete construction safety and Project Management and Construction Management degree programs

Top 5% Teaching Award

## Paul Westerhoff



# Regents Professor and Vice Dean for Research and Innovation

PhD, University of Colorado

**Expertise:** Expert in water quality and treatment, including use and risks of nanotechnology

## Avi <u>Wiezel</u>



#### Associate Professor, Assistant Dean for Facilities

PhD, Technion-Israel Institute of Technology

**Expertise:** Leadership for project based companies

## **Faculty Emeritus**

William W. Badger, PhD Howard H. Bashford, PhD Allan Chasey, PhD Apostolos Fafitis, PhD William Houston, PhD Paul Johnson, PhD Matthew Witczak, PhD

## Farewell

We thank the following faculty for their service and wish them well.

**Jaewon Jang,** Assistant Professor, Left for Hanyang University in South Korea, July 2017

Dean Kashiwagi, Professor, retired June 2017

**Jacob Kashiwagi,** Assistant Research Professor, returned to private practice, December 2017

**Thomas Roberts,** Professor of Practice, returned to private practice, June 2017

**Jeffrey Stempihar,** Assistant Research Professor, returned to private practice, August 2017

**B. Shane Underwood,** Assistant Professor, left for North Carolina State University, July 2017

Edwin Weaver, Senior Lecturer, retired December 2017

## Claudia Zapata



Associate Professor PhD, Arizona State University

**Expertise:** Environmental effects on fluid flow and volume change of unsaturated/problematic soils

## Xuesong Zhou



Associate Professor PhD, University of Maryland

**Expertise:** Dynamic traffic assignment, traffic demand analysis, traffic flow estimation and prediction, train timetabling

## School of Sustainable Engineering and the Built Environment

Paul C. Johnson

2017

Daniel S. Mardian Sr.

1990

Hall of Fai

Vernon L. Hastings

1993

Robert H. Johnson

William W. Bill" Badger

2010

1997

wink" Ames

J. Doug Pruitt

2007

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