

# CE CONNECTION

Your Link to the Department of Civil Engineering

SPRING 2019 | ISSUE 28



*Precast Bridge Studio kicks off new PCI Foundation-funded curriculum development.*  
— Pg. 24

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Wood Rodgers
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Ready for Competition



**SACRAMENTO STATE**  
Department of Civil Engineering

# CHAIR'S MESSAGE



Dear alumni, colleagues and friends,

Spring is in the air as we release our first newsletter of 2019! I hope you enjoy reading about the wonderful and exciting activities of our faculty and students in recent months.

We recently hosted our 11th annual Ken Kerri Endowment Fund Luncheon, featuring keynote speaker Dr. George Tchobanoglous, Professor Emeritus from UC Davis. The event brought together more than 140 alumni and

regional industry partners to learn more about "Wastewater in the 21st Century: Challenges, Trends and Opportunities." Each year, the luncheon kicks off our annual fundraising effort; this year represented our most successful ever with over \$45,000 raised to support our civil engineering students, faculty, equipment needs and infrastructure upgrades. Thank you to everyone who contributed! I am so appreciative of our community's generosity. Next up is our annual Golf Tournament, scheduled for September 13 at Mather Golf Course.

With the spring semester also comes a flurry of student competition activities. Our Earthquake Engineering Research Institute (EERI) student chapter competed in the seismic design competition in Vancouver, the Steel Bridge team traveled to San Luis Obispo, and several teams attended the American Society of Civil Engineers (ASCE) Mid Pac conference in San Jose. The latter conference featured the reemergence of Sacramento State's Concrete Canoe team – it was great to watch the students reinvigorate the competition team.


*I wish everyone a safe and fun summer!*

**Ben Fell**

*Chair, Department of Civil Engineering*



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## Upcoming Events

Gain access to all of these events through the Department of Civil Engineering Sponsorship Program! Information for 2019 sponsorship is now available at:

<http://www.ecs.csus.edu/ce/pdfs/sponsorship2019.pdf>

### September 13, 2019:

Civil Engineering Golf Tournament,  
Mather Golf Course

### November 7, 2019:

An Evening With Industry,  
Sacramento State

[www.ecs.csus.edu/ce](http://www.ecs.csus.edu/ce)

Like us, and follow us to stay up to date on current CE News and Events!



## Support the Department

Looking for a way to support the Civil Engineering Department? We have four different funds that enhance our ability to educate students:

- ▶ **The Ken Kerri Endowment Fund** – Provides support for faculty and student enrichment activities.
- ▶ **The CE Freshman Scholarship Fund** – Scholarships to outstanding freshmen.
- ▶ **The Graduate Environmental/Water Resources Scholarship Fund** – Scholarships to deserving graduate students in the environmental or water resources engineering areas.
- ▶ **The Department Trust Fund** – These resources support student attendance and participation at conferences and competitions, senior design project team expenses, and equipment for labs when other funds are not available.

To donate to any of these funds, go to [www.ecs.csus.edu/ce/support.html](http://www.ecs.csus.edu/ce/support.html) and follow the directions for online donations.

- ▶ Or mail a check made out to the appropriate fund to:

Attn: Ashley Mihok  
California State University, Sacramento  
Department of Civil Engineering  
6000 J Street, MS 6029  
Sacramento, CA 95819

- ▶ For additional questions on how to give, contact:

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# Evening with AN INDUSTRY

## FEATURES

### Oroville Talk & Professional Panel Q & A



The November event designed to introduce Civil Engineering students to industry professionals, An Evening With Industry, once again packed seats at the Alumni Center with students eager to hear about life as a professional engineer.

The keynote speakers were Assistant Deputy Director Ted Craddock and Supervising Engineer Jim Lopes from the California Department of Water Resources, who gave a fascinating account of the Oroville Spillway recovery effort necessitated by the spillway's failure during winter storms in early 2017, complete with photos of the repairs throughout each phase of the project.

"Construction began in June, and it had to be usable by November," said Mr. Craddock. "This is typically done in 10 years. The number one goal was to restore the ability to release water to the lake and restore the capacity of the flood control chute. Time was our biggest constraint."

At 770 feet tall, the Oroville Dam is the largest in the U.S. The damaged spillway displaced 1 million yards of material, a void that needed to be filled to provide structure. The tall vertical slopes meant the recovery effort presented considerable safety risk for the workers, and the condition of the lower chute was unknown.

"We convened a panel of engineers in just a few weeks from across the country," said Mr. Craddock. "We asked, 'What are the options to restore the structure?' Public safety required that we have Plans A, B and C." The team rose to the challenge right away to begin addressing the enormous task at hand.

Mr. Lopes spoke about the construction effort, which included placement of 30,000 cubic yards of structural concrete, 42,000 cubic yards of leveling concrete, and 750 people working seven days a week. He covered some of the challenges and the triumphs (including no reportable injuries in 2017), and partnerships with the Department of Fish and Wildlife and other stakeholders for mitigation of the project's environmental impacts to fisheries. He also lauded the construction contractor.

"DWR's success with the construction contractor is a model for work between a construction [team] and engineers," said Mr. Lopes. "We worked out problems the same day – we had to! We did a lot of procurement of materials in advance and kept them in onsite storage in case of supply chain problems."

The DWR presenters invited questions from the audience, then a panel of six professional engineers – all of them graduates of the Sacramento State Civil Engineering program – opened the floor to questions from curious students.

## Sound Bites: Panelists Offer Professional Advice to Students



**An Evening With Industry is designed to give students a sneak peek – and a head start – into the professional world of engineering. The six panelists at the event offered candid advice from each of their unique vantage points:**

**Ashley Moran, PE**, a Water Resources Design Engineer with the California Department of Water Resources, on how hard it is to stay up on advances in technology and materials: "I'm a design engineer, but I volunteer to go with other professionals into the field. It's humbling. To get out there and see it changes your design perspective. One summer I went to a dam project; then I took Professor Aryani's class and saw it completely differently, having been out there and seeing it. Don't be afraid to volunteer."

**Ashley Moran** on how to approach applying for grad school: "If you don't have an internship, I highly recommend it. Mine was life-changing for me. I looked at every class totally differently. Sac State allows me to work full-time and the department supports me through and through. The program is really accommodating to working professionals. They're as interested in your success as you and your family are."

**David B. Robinson, PE**, Fehr & Peers Principal-in-Charge for the Sacramento Region, on what aspect is most important in an employer: "Be willing to take a risk. You want an environment that's collaborative, supportive and rewarding."

**Mark E. Andersen, PE**, a Senior Principal Civil Engineer for Stantec's California Waterpower and Dams practice, on how long it takes to feel confident as an engineer: "It's such a broad, deep field, and you don't know what you don't know. Never stop learning."

**John Preston, PE**, Area Manager for the South Bay at Ghilotti Construction, on how hard it is to stay up on advances in technology and materials: "If you don't adapt, you die. When I graduated 10 years ago, it was way different. I take continuing education to minimize mistakes and increase efficiency."

**Jeff Riley, PE**, Senior Engineer at Carollo Engineers, on whether having a master's degree helps with the transition from college to career: "It aided my credentials and was good experience, but I learn more in two weeks on the job than I did in a semester. An MS is essential for some, but there's no substitute for real-world experience."

**Jeff Riley** on how to approach applying for grad school: "Get out and talk to people. Go to the schools, meet with the professors. I called and emailed them, had lunch with them, bombarded them with questions about the program, and asked about their research areas. Find a program and advisor that fits your choices."

**Bradley Waldrop, PE**, Regional Managing Director for NV5, on whether it's possible to get your PE before graduation: "Be willing to make mistakes. Demonstrate judgment to sit for the exam. Spend time to learn and get people to coach you through judgment. I worked at Dokken and Emson, and they allowed me to establish that judgment on my own. Find an environment like that."

# INTERNSHIP Spotlight



› From left to right: Ian Tabbada, Monica Cedeno and Matthew Zimmerman



**W**ood Rodgers was established in 1997 by a small group of Sacramento State graduates who set out to create an engineering firm with a different culture than any they'd worked in before.

Today, the firm has more than 250 employees with five offices in California (including the Sacramento corporate headquarters) and two in Nevada. Covering a wide range of engineering services including surveying, geotechnical, structures, transportation and water resources, Wood Rodgers is a success story with its roots at Sac State.

## — Feature Your — INTERNSHIP!

Does your firm or agency employ Sacramento State interns? Or are you a student who wants to share your great internship experience?

**Contact us at [ashley.mihok@csus.edu](mailto:ashley.mihok@csus.edu) and you may be featured in an upcoming CE Connection!**

## Student interns share their experience working at Wood Rodgers:



Working at Wood Rodgers, I have been given the opportunity to develop my AutoCAD skills through creating plot plans for subdivisions, making revisions for as-built drawings, and assisting with plan and profile sheets for improvement plans. Through the training and seminars I have undergone, what I found most important is to understand why things are done and to find ways to be more efficient. A value here at Wood Rodgers is to challenge the way things are and create what should be. Overall, my internship at Wood Rodgers is nothing short of fulfilling and an experience worthwhile.

— Ian Tabbada



I'm currently learning about hydrologic and hydraulic analysis in the water resource section. One of the most valuable things about working here is the experience where I'm able to expand my knowledge in the industry and make great connections. I feel challenged, but it provides me with the opportunity to grow and learn before entering the real world.

— Monica Cedeno



The Sac State interns we've hired are a great resource for us. These were people Dr. Fell told me about personally. The university is good at identifying top talent; our relationship with Sac State is a mutually beneficial one.

— Jonathan Kors  
Vice President, Wood Rodgers



During my short time working with the water resources team at Wood Rodgers, I have learned many aspects about engineering that I otherwise would not have learned in the classroom. The people here really care about the work they produce, which really inspires me to become the best engineer and person that I can be.

— Matthew Zimmerman



Read more about Wood Rodgers' Jonathan Kors in the Alumni Spotlight article on page 12.



# STUDENT Spotlight

## RACHAEL DAL PORTO

**R**achael Dal Porto – pursuing a double major in civil engineering and chemistry with a minor in environmental studies – is a third-year student who sees nothing but opportunity ahead. She looks forward to a career that intersects all these areas with public policy.

### How did you decide to major in civil engineering?

When I first got to Sac State I studied kinesiology, but I became concerned about whether that [career field] could sustain me and a family. I also wanted to work in a realm that deals with the environment, and civil engineering has so many different facets. It's more in touch with the public and public policy, so I thought it was a better fit.

### Are you leaning toward any particular area of focus – structural, transportation, water?

I have not taken all the classes, but I'm leaning more toward environmental or water resources. I am also majoring in chemistry, so I do research at school and it deals with water quality and contaminants in water, which goes hand-in-hand with the environment. I think water is a basic human right and something that's going to continue to be a pressing social justice issue, not only in American but the rest of the world, so I want to be able to assist.

### Do you see yourself entering some sort of policymaking career?

Yes, I've thought about environmental law, perhaps becoming some sort of attorney. I currently serve in some capacity – I was elected the ASI (Associated Students, Inc.) Executive Vice President on campus. I wanted to get a look into what policy is like and what a more political, representative role would be like. I've taken some environmental law and policy classes as well as environmental ethics. I'm seeing what that is like in the case that, after my time here at Sac State, I end up wanting to pursue a law background. I think we definitely need more folks with technical backgrounds in positions of policymaking.

### Besides water, as you mentioned earlier, what interests you about a career focusing on the environment?

My passion – everything I like to do – centers around camping and backpacking. At graduation I plan to hike the Pacific Crest Trail from Mexico to Canada. That is one hundred percent what

interests me. Water quality, air quality, and environmental protection and preservation are social justice issues. Making sure folks of every background have access to clean water and air for generations to come is something I think is incredibly important.

### Why did you choose Sac State?

I live near Sacramento, and college is expensive! Sac State was fiscally a good decision where I could still live at home, so I only had to focus on paying one set of bills and tuition. I love Sacramento and think it's an incredibly cool, diverse, and unique city, especially in terms of water, engineering and policy. Here at Sac State in the Civil Engineering Department, the professors have such an incredible knowledge base and are so helpful, very hands-on and accessible. It just makes me so grateful to be here at Sac State.

### Tell me about your role as executive vice president for ASI.

I was pretty introverted in high school, so coming out and doing a lot of public-facing work was nothing I've ever experienced before, but what Sac State does is allow students to be in this position. Advocating on behalf of our student body to those law and policymakers as well as to the university and the Chancellor's office is incredibly humbling. Creating events and spreading the word around campus about what is going on is engaging and necessary! I've had the privilege to work with our Green Team, Environmental Student Organization, and Sustainability to create a lot of incredible events centered around the environment here on campus; it is a great experience.

### Are you involved in any student clubs?

I'm involved in the General Education Honors Program as well as the Chemistry Club, but within Civil Engineering, I'm a member of the ASCE student chapter and participate in some of their Mid Pac competitions. That's been one of the coolest parts of college: the technical aspect of being part of these competition teams. But also, it is a great place to make friends and connections. These clubs and competitions create an incredible sense of community and make this department feel like a family.

### What has been your favorite Civil Engineering class so far?

I'm torn between two classes I'm in currently! First is water resources – Professor Merayyan is incredible. I'm also in transportation engineering, and to be honest, I thought I would not like it. But Dr. Khan and Dr. Abadi have made it really interesting and very engaging to me. Both classes obviously are technical, but what makes them stand out to me is the personal aspect; early in the class we all learned of the true problems that need to be solved, and as engineers in training, that is what we are set out to do!

### Which professors have stood out in your educational journey?

Dr. Fogarty has been one of my favorite professors in all of college. She is an incredible professor; she makes everything

very understandable. I think she is so brilliant in the way she conveys what she knows to students. She just makes the class accessible economically and gives you all the tools needed to succeed.

### What are your plans after graduation?

I absolutely plan to go to grad school, to get a master's in some form of environmental or water resources [engineering], and then after that I'm heavily debating between an environmental law degree and getting a Ph.D. because I'd really like to be an engineering professor one day. College has been an incredible experience for me; very uplifting and probably the greatest

time of my life so far. I want to be sure others get the same incredible experience from their professors that I got.

### How has your experience at Sac State been so far?

I couldn't have thought up a better undergrad career. There are so many opportunities: the professors here are incredible, and the administrators are truly committed to student success, they're ready to listen and do what it takes to ensure students succeed. I think civil engineering, more than any other major, does a fantastic job of getting students ready for success in the professional world and provides them the necessary support and community to make it there.

“

"...In the Civil Engineering Department, the professors have such an incredible knowledge base and are so helpful, very hands-on and accessible. It just makes me so grateful to be here at Sac State."

— Rachael Dal Porto



# ALUMNI *Spotlight*



## JONATHAN KORS

**B**orn and raised in El Dorado Hills and educated at Sacramento State, Jonathan Kors ('95) regional roots run deep, and now he's found his way back to the university to help strengthen the pipeline of students emerging into the civil engineering field.

Now a Vice President at Sacramento-based Wood Rodgers with more than 20 years of professional engineering experience, Jonathan finds himself mentoring interns and newly graduated engineers, many of whom come from Sacramento State's Civil Engineering program (read more about Sac State interns at Wood Rodgers on page 8).

Encouraged by fellow alumnus Ric Reinhardt ('96, MS '98), Jonathan now advises his alma mater by serving on the Civil Engineering Department's Environmental and Water Resources Engineering Graduate Program Industrial Advisory Committee, as well as the College of Engineering and Computer Science Partnership Committee. Both committees give industry members the opportunity to provide input to the university as it formulates curricula, with a mutual goal of preparing students to be ready to work from their first day on the job.

Jonathan, Ric and their peers are "looking back now and saying, 'This school was really good. We want to help it and give back to the young folks coming down the same path,'" says Jonathan. "Dean Smith and Dr. Fell have been very receptive and appreciative of our input. I've come to realize that I have a lot to say about [curriculum] because we hire a lot of students right out of school. Our Board of Directors at Wood Rodgers charged me to build on our relationship with the Civil Engineering Department. They see a lot of benefit in

having a top-notch engineering school right in our backyard."

Before he ever set foot on the Sacramento State campus, Jonathan's youthful hobby of drawing houses and boats led him to initially pursue architecture at American River College. But he soon learned it was a popular major and the limited number of California schools offering architecture study were heavily impacted. Looking at his own father's experience as a mechanical engineer in the aerospace industry, he saw that the profession provided well for their family and afforded his father a level of respect Jonathan admired. "My only act of rebellion was to go down the civil path versus mechanical," he says with a laugh.

After working his way through college with internships – both of which he credits to referrals from the Hornet Foundation – at the State Archives and the Division of the State Architect, Jonathan graduated in 1995 and landed on his first job site in San Francisco, part of a multidisciplinary team of engineers overseeing construction subcontractors. He relished the excitement of watching a project go from paper to reality, but he noticed a commonality among the workers who maintained this nomadic lifestyle.

"When that ended, all those people in the [construction] trailer were going to Kentucky, Guam, the Middle East," says Jonathan. "They'd been to those places, and none of them had a good relationship with their family. I didn't want to do that, and I also wanted to get back to Sacramento."

Once the job ended after a year, Jonathan did just that, taking a job in water resources engineering with Borcalli & Associates. He worked there under the guidance of Fran Borcalli ('64),

"In my experience the people coming out of Sac State's Civil Engineering program are top-notch, and I'm not just saying that...Some of the best and brightest we have are Sac State graduates."

— Jonathan Kors

PE, for six years until the firm was bought by Wood Rodgers, where Jonathan has remained.

"It's been a great place for me; I started as a staff engineer and worked up to where I am now," says Jonathan, who also serves on Wood Rodgers' Board of Directors. "That tells you something about the firm. A lot of people think you need to jump from one firm to another, but nothing [else] has been such a good fit."

One of his proudest professional achievements was the Sutter Butte Flood Control Agency's Feather River West Levee Project, in which Jonathan served as Deputy Project Manager for the team of consultants from Wood Rodgers, HDR and AECOM that evaluated and designed 40 miles of levee improvement at the west levee of the Feather River over the course of eight years. "Wood Rodgers highlighted that project at our open house last year," he says.

Jonathan also points to a project with the Sacramento Area Flood Control Agency Natomas Levee Improvement Program in Sutter and Sacramento Counties, in which he managed 15 miles of levee improvements, saying, "It's satisfying to say we've strengthened those levees and they're not the risk they were before."

Jonathan and his wife Jennifer are parents to four children, and recently purchased a travel trailer to recreate some of his fondest childhood memories of camping in the national parks. "You learn a lot about your kids being in a combined space with them for two weeks," he notes.

Now that his professional expertise and Sac State heritage are intersecting and he's guiding young engineers, Jonathan says seeking a mentor early in your career and staying connected to other alumni are key success factors.

"We've grown together, started at the bottom rung, but all had good careers and are players in the industry," says Jonathan of his fellow alumni. "It's good to have that network. In my experience the people coming out of Sac State's Civil Engineering program are top-notch, and I'm not just saying that. Wood Rodgers gets a good cross-section from all engineering schools. Some of the best and brightest we have are Sac State graduates."



› Jonathan Kors with his family.



# Conference Presentations

## *Open Doors*

### For Professor Abadi

**U**nder the umbrella of the National Academies of Sciences, Engineering and Medicine, the Transportation Research Board (TRB) is one of seven program units designed to provide objective analysis, information and advice to the nation on complex issues. Transportation Engineering Professor Masoud Ghodrat Abadi recently attended the TRB's 98th annual meeting, a Washington, D.C.-based gathering of more than 13,000 transportation professionals from around the world.

"Everyone involved in transportation is there," said Dr. Abadi. "You can find university professors, graduate and undergraduate students, transportation scientists and researchers, and even government officials, not only from the U.S. but from all over the world. If you want to know about cutting-edge research in transportation, or start a research collaboration, or need to ask a question of a colleague – whatever it is, you can find it there."

Dr. Abadi submitted two papers for consideration in advance of the meeting, and both were accepted for presentation as well as for publication in the journal *Transportation Research Record*. The topics of both papers were based on doctorate research he conducted at Oregon State University (OSU).

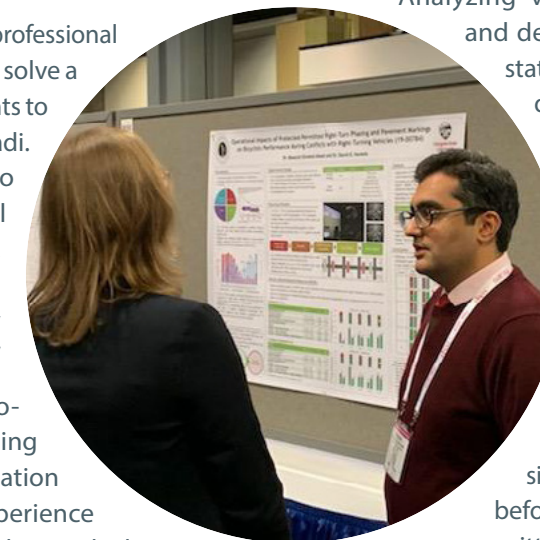
"We wanted to know how and why professional engineers use specific resources to solve a problem, so we can help our students to think in the same way," said Dr. Abadi. "We used eye-tracking devices to look into the engineers' visual attention while solving a problem. We tried to close the connection between the eyes and the brain by looking into the fixation duration."

It was an interdisciplinary, two-phase project that received funding from the National Science Foundation and involved professors with experience in cognition theory. The second phase, which continued after Dr. Abadi graduated and moved to California, analyzed the discrepancies between the engineers' eye movements and those of engineering students.

"We were looking into contextual representation, for example, if people are given a table, graph or flow chart, how do they engage with these different representations to solve a problem?" he said. "We found out flow charts are more complicated to navigate based on fixation duration, but a lot of professional engineers use them because they're more comprehensive. As an instructor trying to guide my students to think the way professional engineers do, it's not always the speed with which you can solve a problem. Sometimes it's the comprehensiveness and detail of the contextual representation."

The second paper, also originating at OSU, studied bicyclist safety in dense urban environments.

"OSU is one of maybe three labs in the entire country with a full-scale bicycling simulator," said Dr. Abadi. "We created a virtual environment similar to downtown Seattle and put the bicyclist in conflict with a truck pulling out of a loading zone, or a right-turn vehicle turning in front of them. We wanted to see how we could introduce engineering treatments like pavement markings, warning signs or different configurations of signals to improve bicyclist safety. How can we convey the message there's a hazard on the road and get bicyclists to go slower and move away from the travel lane?"



Analyzing variables like velocity, acceleration and deceleration, the team used advanced statistical models to test the efficiency of different engineering treatments. "We found that treatments are dependent on each other, so when we apply one, bicyclist behavior could vary. There is no single prescription for every possible case."

The TRB meeting not only gave Dr. Abadi the chance to showcase past research, but it created a new professional opportunity. He was one of six conference presenters invited to speak before one of the TRB's standing technical committees, the Simulation and Measurement of Vehicle and Operator Performance, for consideration as a potential new member.

"We were invited to present our past work and say what we want to do in the future," he said. "I talked about my ideas for developing active transportation research at Sac State. I'd love to have a driving and bicycle simulation lab, maybe even pedestrian simulation. There are a lot of prominent committee members who I'm sure would be happy to help. It would be a huge advantage for me as a Sac State faculty member to be part of the committee."

Dr. Abadi was recently informed that he was selected to be part of the TRB Standing Committee on Simulation and Measurement of Vehicle and Operator Performance (AND30).





## Introduction to GIS Class Culminates in Poster Presentation

"I wanted to develop a course in GIS specifically for civil engineers to give them the skills and tools necessary to make more effective decisions when solving problems in the field..."

— Dr. Ghazan Khan

In autumn 2014, Dr. Ghazan Khan was in his second year as a transportation engineering professor at Sacramento State when he launched the Introduction to Geographic Information Systems (GIS) in Civil Engineering (CE 151) class.

"I wanted to develop a course in GIS specifically for civil engineers to give them the skills and tools necessary to make more effective decisions when solving problems in the field," said Dr. Khan. "It's an introductory level course, but it moves very quickly to the end of the semester where I ask the students to do a group project. They address a civil engineering problem and showcase their GIS skills."

The visual nature of GIS maps and charts meant a poster presentation was a perfect way to display what students had learned, so that's what Dr. Khan implemented back in 2014. It's been a tradition each year since. The most recent showcase in December 2018 caught the attention of the College of Engineering and Computer Science Dean Lorenzo Smith and Civil Engineering Department Chair Ben Fell, both of whom attended.

"The idea is to have a poster session to present these nice-looking maps and charts in front of the college and other students and faculty," said Dr. Khan. "I want them to take pride in the work they've done because this is a tough course. [Staff from] the Office of Water Programs were there; they do a lot of GIS work so they were interested

in seeing the students' skills. I've seen employers attend."

Many university course offerings include GIS, but they're not typically tied to the civil engineering field. "This is an elective course, but I have students coming from all five different areas of civil engineering," Dr. Khan said, noting that most employers expect candidates to have GIS knowledge.

Because students in this class have such varied interests, the poster presentation event has some fun surprises. "Students pick their own problem statement, analyze that problem using GIS and show a solution," said Dr. Khan. "You see a wide variety, from analysis of soil samples on the Sac State campus, to air quality monitoring in the city of Sacramento, to the relationship between land use values and air quality. One group mapped Starbucks locations and used route connectivity data to determine whether they were clustered too much in certain areas of the city and not others."

The poster presentation gives students the opportunity not only to share their new GIS knowledge, but to hone their public speaking skills. It also provides a venue for creative problem-solving. Said Dr. Khan: "Route analysis and spatial clustering and patterns; these are important parts of GIS, but students presented them in a fun way."

# Learning From California

Applying Water Resources Experiences To Jordan



“One of the reasons I went into water resources was due to the water scarcity in Jordan when I was growing up there...I was trying to solve these problems...  
— Dr. Saad Merayyan”

**D**r. Saad Merayyan recently completed a well-earned goal that was a long time in the making: a semester-long sabbatical during which he traveled to Jordan to study water systems in comparison to those of California.

“The water supply in California is not consistent,” said Dr. Merayyan. “It’s the same thing in Jordan: the supply varies a lot and depends on rain as a main source. Jordan’s water system is a fraction of California’s, but they face the same issues, practices and management challenges. The population changes in Jordan are higher than in California; Jordan accepted many refugees from neighboring countries. Gaining 800,000 or 1 million refugees over a short period creates stress on Jordan’s water sector and infrastructure.”

Jordan is one of the top 10 water-poor countries in the world, and has absorbed the arrival of refugees from conflicts in neighboring Iraq, Syria, Yemen and Libya, including both Gulf Wars. “Jordan’s population went from 4 million to 10 million in the span of 10 to 20 years,” said Dr. Merayyan. “Imagine the stress on the social and economic systems in Jordan. Natural and human resources became issues. Infrastructure is an issue.”

**“Jordan’s water system is a fraction of California’s, but they face the same issues, practices and management challenges.”**

— Dr. Saad Merayyan

During his two-and-a-half months in Jordan, Dr. Merayyan held several meetings, including one with officials from the country’s Ministry of Water and Irrigation where they discussed management strategies to deal with shortages; simulation and modeling of water systems to predict future shortages; and how Dr. Merayyan could assist them remotely in wrestling with these challenges.

One of the professional highlights of his sabbatical was giving a keynote talk before more than 150 attendees at the Jordan Engineers’ Association. The association has more than 50,000 members across Jordan, where engineering is one of the leading professions. “The talk was related to lessons learned in Jordan, looking at California water resources and how Jordan could benefit from California’s experiences with droughts, flooding, and managing water resources,” said Dr. Merayyan.

He gave another invited talk at the Royal Scientific Society in Jordan, led by Her Highness Princess Sumaya bint El Hassan. “We talked about similar issues [as the previous lecture] but the focus was on the environmental consequences and the

water-energy nexus and requirements in Jordan,” said Dr. Merayyan. “Jordan wants to look at how California moves vast amounts of water and solves energy problems by using renewable energy, and the environmental consequences. It was a satisfying discussion with professionals who have been doing this type of work for many years in Jordan.”

As part of his sabbatical, Dr. Merayyan will complete a report titled: “Water Resources in a Global Village.” The journey renewed his already keen perspective on global water issues.

“One of the reasons I went into water resources was due to the water scarcity in Jordan when I was growing up there,” he said. “There were always water shortages. I was trying to solve these problems – a young man trying to fix the world. It turned out it takes more than one person to solve the problem.”

In the classrooms at Sacramento State, many students haven’t

had the chance to experience life in countries where water is scarce and requires hours of travel and effort or extra expense to acquire.

“Students don’t realize how much water they use on a daily basis or appreciate how valuable and important this natural resource is to humanity,” he said. “Some people don’t get water for a week or two, and when they get water delivered they have to start storing it. Sometimes they run out. I’m going to share with my students that besides the technical aspects, there are social, economic and environmental issues [surrounding water].”

Glad for the opportunities afforded by the sabbatical, Dr. Merayyan hopes others will have similar experiences. “Faculty should take advantage of sabbatical leaves for their career development and to achieve their professional goals,” he said. “Thinking about issues from outside, without the stress and demands on your time that occur on campus, provides a lot of clarity. You have energy to do this work you’d never be able to do while on campus.”



# 5<sup>th</sup> Textbook Volume Completes Dr. Aryani's Self-Published Series

Over the past 20 years, Professor Cyrus Aryani created a set of five textbook volumes so he could offer his students a practical geotechnical engineering manual that's affordable, easy to understand, and that they could continue to use throughout their careers. With the recent completion of his fifth volume, Dr. Aryani is pleased with his finished product.

The five volumes are under the title Geotechnical Engineering: Applied Soil Mechanics and Foundation Engineering. "I use volumes 1 and 2 for undergraduate work, and volumes 3, 4 and 5 for graduate study," said Dr. Aryani. "Volume 5 focuses on geosynthetics."

Prior to his career as a university professor, Dr. Aryani was an engineering consultant, where he learned the practical applications of geotechnical engineering. It was during his first 10 years at Sacramento State when he became frustrated with the lack of books that covered geotechnical engineering topics in a clear and practical way. "I knew there must be a better way of doing this," he said. "I thought I could write a book that was more straightforward, easy to follow and to use in practice."

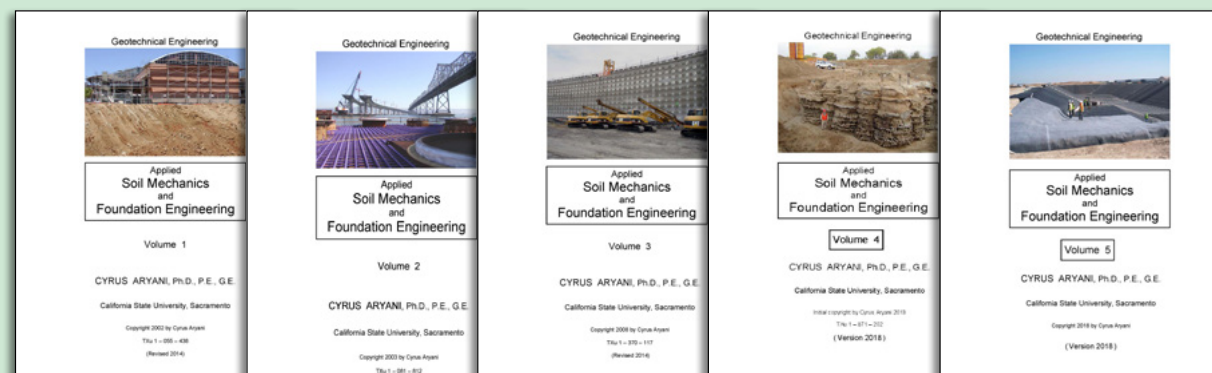
His books are self-published and available at the Hornet Bookstore. "I did the typing, drawings, figures, illustrations, and page setup," said Dr. Aryani. "The unique design of the books allows the user to look up a topic of interest and be able to find, in most cases, the specific information all on the same sheet with related figures and tables, eliminating the need for figure and table referral numbers. Several publishers came to me [to offer publication] when I applied for copyright, but I want to have control over the books so I can update them on a regular basis. I found that more efficient because I've made several changes over the years."

After the hard work of finishing volume 5, Dr. Aryani says he has no immediate plans to expand the series further, but that could change. Either way, continuing to update them is expected. "Volumes 1 and 2 cover the fundamental topics in geotechnical engineering, so the concepts change little over time," said Dr. Aryani. "Volumes 3, 4 and 5 change quite a bit. Volume 5 covers new technology: inclusion of polymeric material in civil engineering applications. That is relatively new, and we're one of a handful of universities in the nation that offer curriculum on geosynthetics."

"I've been working on these books for 20 years and it takes a lot of dedication," he continues. "Writing these books is overwhelming if you think of the end product, but my attitude was to just take one page at a time."

When he encounters former students, they often tell Dr. Aryani that they've continued to use the books he wrote in their professional practice. Online orders for the volumes come from in and outside of California. "They say it's straightforward and easy to understand, and the cost is low compared to other books," he said. Dr. Aryani's books are sought-after by practicing engineers who are preparing for their professional engineering (PE) license and geotechnical engineering (GE) license exams.

Knowing he's providing such a useful resource to his students and graduates is only part of the fulfillment Dr. Aryani experiences from writing the books. "Someone once told me that if you want to learn something well, try to teach that subject, and if you want to learn it really well, try to write a book about it," he said. "I continue to seek the latest information in my field; it's been a learning experience for me as well and that's the most rewarding part. I am grateful to my students for giving me the opportunity to learn with them."



## ASCE Youth Leadership Conference Inspires Networking in Paradise



Chris Grottkau may have been the sole representative of Sacramento State's American Society of Civil Engineers (ASCE) student chapter attending the Workshop for Student Chapter Leaders, but he made the most of his time at the March event that took place at the Hilton Hawaiian Village in Waikiki.

"The workshop allows for networking and getting to know people outside my area," said Chris, who holds a leadership position in Sac State's ASCE student chapter and is one of two project managers for the Mid Pac Concrete Canoe team. "Going alone was a blessing in disguise. I'm a social person, so I tried to always sit at a table with someone I hadn't sat with before. I got to talk to most students and got a lot of contact information, and I spoke to a few professionals as well."

The Workshop for Student Chapter Leaders was part of a larger ASCE 2019 Multi-Region Leadership Conference for Region 8 (encompassing nine western states and several Canadian provinces) and Region 9 (Sacramento, San Francisco, San Diego and L.A.) that also included the Workshop for Section and Branch Leaders and the Western Region Younger Member Council.

The workshop kicked off with a breakfast get-together followed by several icebreaker activities, including students shouting their school cheer. "That's hard to do when you're the only one," Chris said. "I just stood up and yelled 'Go Hornets!' as loud as I could. One attendee from another school texted one of my friends and said 'The guy from Sac State was really loud!'"

Because of his past work with the Mid Pac Concrete Canoe

team, Chris knew some fellow workshop attendees from University of Nevada at Reno (UNR) with whom he had previously spent time together paddling at UNR.

Many of the workshop activities paired student leaders with Younger Member Council attendees to jointly solve challenges like determining what infrastructure would be necessary to colonize Mars in the event earth became uninhabitable. They also completed bingo cards by finding other attendees who had done things like waterski or who owned a slide rule, for example.



"The real opportunity to work together was writing small paragraphs based on three questions," said Chris. "One of them was about the Dream Big movement, which is something ASCE created to encourage high schoolers to pursue STEM majors. Another question tackled the difficulties and accomplishments of student branches and Younger Member chapters. We learned what hardships they face and new ways to do things at our own chapter."

Though the workshop kept attendees busy and inside much of the time, Chris and his peers found "plenty of time to visit the beach."

Gratified with the experience, Chris says it was an eye-opener. "I realized not all ASCE chapters are the same; some schools have 300 students that come to meetings and some have only 10," he said. "We learned how to better interact with the students as leaders. I believe this conference was one of the best and most rewarding things I have done for ASCE. I'm amazed at the sheer amount of people at all levels that are part of ASCE. I met so many amazing people that weekend."

# Mid Pac Teams Ready for Competition



After serving as the host campus for the 2018 American Society of Civil Engineers (ASCE) Mid-Pacific Competition, Sacramento State's ASCE student chapter emerged stronger and better prepared for future competitions because of the victories and lessons learned managing such a large-scale event.

This year, Mid Pac takes place at San Jose State University April 18-20, with Sacramento State students participating in Concrete Canoe, Water Treatment Challenge, Geowall Challenge, and Transportation Challenge. (The Steel Bridge competition is no longer affiliated with ASCE and is therefore not part of Mid Pac, but still took place April 4-6 at Cal Poly San Luis Obispo, hosted by the American Institute of Steel Construction and with Sac State competing).

In the thick of Mid Pac crunch time, CE Connection was able to catch up with some of the team project managers to find out how the teams are preparing.

## CONCRETE CANOE

"We are much farther along than we were at this point last year," said Chris Grottkau, one of two project managers for

the Concrete Canoe team. "We had some issues with the self-consolidating concrete we used because it's flowable and doesn't retain its shape. You can't put that on a mold, it doesn't work. To fix that and repour the outer layer – I'm proud of what we've done. I recently saw the canoe and it looks absolutely beautiful."

Overseeing a Concrete Canoe team of about 10 dedicated members along with Chris is Rodolfo "RJ" Guiao, Jr. "We've been having meetings, [doing everything] from testing multiple concrete mixtures to paddling out in the river," said RJ. "Since the team is starting from scratch, we reached out to an alumnus for guidance. I feel like we're on track for the competition. We just finished pouring our canoe, and that is by far the most difficult part of this journey."

## WATER TREATMENT

On the Water Treatment team, which has about 12-15 steady members, co-project manager Steffen Berr says the challenge is like those of previous years: a major earthquake devastates a Pacific Coast town and the team must build a water filtration system to make the polluted water supply drinkable for the town's inhabitants. Teams are given a list

of allowable materials and must optimize their filtration system for volume, water quality and cost effectiveness.

"We decided to run things completely differently this year to avoid the last-minute scramble we had last year, so the first thing we did is decide that project managers serve staggered two-year terms," said Steffen. "This year I'll graduate and my co-project manager takes over; that way the knowledge is always being passed down."

Early on, the team took a water quality sample from the polluted water to determine its pH, turbidity, conductivity and oxygen. Their methodology leaves Steffen feeling confident going into the competition.

"We got a very accurate picture of what's wrong with the water and came up with a tailored chemical treatment process to fix the water," said Steffen. "We met every week for two months of chemical testing, then we moved onto filter design and built multiple test models to see what worked and what didn't. We're now moving to construction practice, figuring out how we're going to assemble everything at the competition."

## GEO WALL CHALLENGE

Sac State's Geowall Challenge team is small but mighty, with about seven members who must build a mechanically stabilized retaining wall within a 25-minute time frame and test it to failure. Going over the time limit penalizes a team's score.

"We have been meeting every day to practice building within this time limit," said Alexis Guerrero, a co-project manager for Geowall. "Given that this is a brand-new group of people, there is a learning curve. They also must learn how to effectively communicate with each other and know their strengths and weaknesses. Every build, this group is becoming more efficient and getting closer to the 25-minute time frame, which makes me very proud."

Alexis and co-project manager Teresa Magana participated on the Geowall team last year, so they're able to impart knowledge to the newer team members about what the competition environment will be like. They feel the team is in good shape for Mid Pac.

"Geowall Challenge will always be the smallest group of all the competition clubs," said Alexis. "But because of our size, we always become a pretty close-knit group."

Mid Pac is about learning to work as a team to solve a problem, and these experiences can provide lifelong memories and valuable experiences. "I would be very proud to go up there at Mid Pac and present our canoe, and will be very proud when I'm in it racing," said Chris. "No matter what happens, I'm proud of what my team has accomplished."



# Precast Bridge Studio

## Kicks Off New PCI Foundation-Funded Curriculum Development



Undergraduate civil engineering students became true bridge designers during the fall when they participated in a new program that includes design of multi-span precast, prestressed concrete bridges through the Prestressed Concrete Design course (CE 168). The program – dubbed the “Precast Bridge Studio” in keeping with similar precast architectural and engineering programs at other universities like USC and Cal Poly Pomona – is the first-in-the-nation, precast bridge-focused venture, funded by a \$100,000 grant from the Precast/Prestressed Concrete Institute (PCI) Foundation for Sacramento State to expose students to the bridge industry and gradually develop a precast concrete bridge curriculum over four years.

“For this class, I always focus on precast, prestressed concrete, but this time I emphasized bridges,” said Structural Engineering Professor Eric Matsumoto, who also conducts precast bridge

research and supports Caltrans implementation of precast bridge systems. “The Precast Bridge Studio represents a unique academia-industry partnership to provide opportunities for students to get directly involved in many facets of the precast bridge industry and become employable with Caltrans, bridge consultants, precasters, and others.”

In 2007, the PCI Foundation began funding precast curriculum development called “precast studios” because of the intensive immersion in precast concrete that originated with schools of architecture. These studios have successfully expanded to many civil engineering and construction management programs around the country, becoming a winning scenario for students and academic institutions, as well as the precast industry. The Sacramento State program is the 23rd studio in the nation, and the first focused solely on bridges.

During fall 2018, the Precast Bridge Studio students were



separated into three five-student bridge design teams, each with a consultant mentor and all working under the guidance of Dr. Matsumoto and Caltrans bridge engineers Jim Ma, PE, and Dr. Say-Gunn Low, PE. The consultant mentors were Bob Fish, SE, from TY Lin International; Jason Hickey, SE, from Mark Thomas & Co.; and Wesley Sennett, PE, from MGE Engineering. Two of the mentors are Sacramento State Alumni.

“All semester long students interacted with the precast bridge industry,” said Dr. Matsumoto. “There was no experimental aspect to the course; it was a bridge design class. However, in performing design calculations, students worked under the mentorship of practicing bridge engineers, sometimes at the bridge firm’s office, because you can only learn so much in a classroom environment. They treasured the life lessons like accountability and professionalism, besides the design and construction aspects!”

“In addition, you have to get out to a precast plant to understand precast bridges,” Dr. Matsumoto continued. “The students unanimously agreed that visiting the Con-Fab precast plant with Brent Koch [chief engineer] in Lathrop was the highlight of the semester. The very moment we drove up, Con-Fab had two 110-foot long bridge girders on trucks ready for hauling out of the plant driveway. Students spontaneously jumped out of their cars to take pictures with the girders. It was an unforgettable moment.”

Partnerships with precast concrete companies like Con-Fab California and Clark Pacific, which recently funded a major concrete lab expansion at Sacramento State, are exactly the intent of the grant from the PCI Foundation. “We’re very fortunate in Sacramento to have both of these precast plants within an hour of campus,” said Dr. Matsumoto. “PCI was also very interested that Caltrans be directly involved in the bridge design project,” he said, noting that each student team worked on a different bridge design project that corresponded to actual sites in the Sacramento region.

At the end of the semester, each of the three student groups made a formal presentation of their project, “Design and

Construction of a Multi-span Precast/Prestressed Concrete Bridge,” before a large audience, half of which were bridge industry members, as well as faculty, fellow students, and administrators. “It was a very exciting atmosphere; we had student presentations followed by Q & A, and then a reception and awards ceremony,” said Dr. Matsumoto. “The students were initially scared to death to present in front of so many industry experts, but they eventually began to relax and ended up doing such a great job that bridge firms began to offer jobs to students that very night.” Quoting one industry expert from that night, Dr. Matsumoto said, “Glen Switzer [Durastress, Florida] correctly noted that, because of the Precast Bridge Studio, there are 15 undergraduates who can immediately contribute to the bridge industry. They’re familiar with the technology and advantages, and already have the ability to design precast concrete bridges.”

Dr. Matsumoto expressed gratitude for the numerous professionals who contributed their time to the Precast Bridge Studio, whether by mentoring the teams, hosting a field trip, giving a lecture, presenting at the new Precast Bridge Seminar, or providing expertise in other avenues.



Clearly excited about the future, he said, “In the spirit of the Federal Highway Administration’s Every Day Counts initiative, the Precast Bridge Studio is promoting opportunities for students to explore the precast concrete bridge industry and its vital role in Accelerated Bridge Construction. I am pleased that my colleague, Mikael Anderson [Construction Management Department Chair], and I have been able to take the initial steps to develop a framework for blending civil engineering and construction management students together in a bridge design and construction project that promises to give students authentic experiences in preparation for their future partnerships in real-world design-build projects. We hope that this is the beginning of a CE-CM interaction and synergy that will greatly benefit students from both departments for years to come.”

### Students



**Danielle Salt – Faculty Senate Scholarship**

"Sacramento State and the Department of Civil Engineering have provided me with an incredible level of support in the classroom and beyond, and I am so appreciative to have received this scholarship," says Danielle. "I would like to thank my faculty sponsor, Dr. Cristina Poindexter, for her ongoing support and guidance."



**Andrii Noga – Tim Fleming Memorial Scholarship**

"Upon receiving the Tim Fleming Scholarship, I have begun to really understand what it means to give; not just financially speaking but with time, energy, focus, and certain skills we possess," says Andrii. "Tim Fleming was a very honest, kindhearted, and hardworking engineer. He treated others with respect and delegated a significant amount of time to bettering the lives of people up until he passed away in 2010. It is these characteristic attributes that I will constantly work on displaying today and in my future engineering career."



**Samira Moradi – Bilma G. Rhinehart scholarship**

"I am extremely honored to have received the Bilma G. Rhinehart scholarship and I feel privileged to be able to pursue a career that allows me to create such a physical impact on the world," says Samira.

### Alumni

**2017**

**Jesus Guerrero ('17)** works in construction management as a Project Engineer for Bay Cities Paving and Grading. "Last year flew by so fast; I was really busy with work," says Jesus. "I was trying to learn as much as I can." Much of his work is widening of highways and roadways, including Hazel Avenue Phase 2 in Fair Oaks; Woodcreek Oaks Boulevard in Roseville; and 14 different onramps to southbound highway 99 in Sacramento.

"I do a little bit of everything for work, from billing for the project to organizing material for our night crew," says Jesus. "I attend weekly meetings and help coordinate our subcontractors. I enjoy what I do for work. I drive by Sac State every day and sometimes I can't believe I am done with school. It is a great feeling. I am the first in my family to receive a college degree and the first engineer. Stingers up!"

**Omar Rasai ('17)** is working as a Project Manager with Paxon Engineering, which contracts with utility companies. "Our current customer is PG&E and I am currently located in San Ramon," says Omar. "I work with the Gas Transition team as a Project Manager for strength testing the system's transmission gas lines. I manage multiple projects at the same time and I enjoy what I do. It has been a really great, challenging experience. I'd like to thank all the professors at Sacramento State for the work and effort you put into helping me become the person I am today."





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