

CIVIL MATTERS

CIVIL ENGINEERING

SUMMER 2021

CARL R. ICE COLLEGE OF ENGINEERING



KANSAS STATE
UNIVERSITY

FROM THE DEPARTMENT HEAD

This past academic year was a continuous challenge due to COVID-19. To the credit of my colleagues, graduate teaching assistants and staff, we were able to successfully complete the term in a hybrid mode (combination of in-person and virtual classes). Forty-three students graduated with B.S. degrees, nine with M.S. degrees and one with a Ph.D. Career placement record rate of our undergraduates is at 98%. This issue of Civil Matters summarizes departmental activities and accomplishments over the past year.

We are very proud of our faculty who continue to win awards at national, regional and departmental levels. Our students have won very prestigious and competitive national scholarships and awards. A number of our students have won scholarships from various professional societies and one received a national scholarship from ASCE. Thanks to outside support, mainly from you, last year we disbursed scholarships to 84 undergraduate students totaling more than \$286,000. We raised almost \$1 million for new scholarships, faculty support and facility renovation during this past year. Our undergraduate academic program has undergone a major revision and we have described our new effort for ABET assessment.

On the research side, our expenditure has been steady despite the pandemic as CE faculty continue to receive national-level grants. We've featured short stories on various research projects in our department.

Our creative inquiry teams continued to meet and work. Although in-person regional competition was canceled, they participated virtually. The department once again added excellent teaching and research facilities to emphasize our "hands-on" approach to civil engineering education. Most of the expenditures for these improvements were borne by alumni like you. We've been also active in various continuing education and technology transfer programs through our Global Campus unit.



Finally, several departmental awards have been renamed to acknowledge sponsorships of alumni and companies. A named lecture will be launched this fall to honor Bob L. Smith who dedicated 43 years of his professional life to this department. We also have featured alumni news and accomplishments in this issue.

It is a distinct honor and privilege to serve as head of this proud department with such a storied history and unqualified alumni generosity. We are grateful to all who have supported us over the years and continue to do so. We are dedicated to educate the future practitioners and leaders in civil engineering and ensure generations of success.

A handwritten signature in black ink, appearing to read "M Hossain". The signature is fluid and cursive, with a long horizontal stroke at the end.

Mustaque Hossain, Ph.D., P.E.
Munger Professor, Department Head and
Civil Engineering Alumni Professorship Honoring
Dr. Robert Snell

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ABOVE: PROFESSOR PRATHAP PARAMESWARAN ASSISTS STUDENT IN CE LAB.

ON THE COVER: STUDENTS COLLABORATE ON STEEL BRIDGE CONSTRUCTION.

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LEADERSHIP



RESEARCH



EDUCATION



EXCELLENCE

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CIVIL MATTERS

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Alumni Profiles



Catherine Patrick ('87) is currently a transportation engineer with the Federal Highway Administration after a 24-year career with the Kansas Department of Transportation, or KDOT. She started her career with KDOT after graduation and steadily progressed before being named state transportation engineer in 2016. She is the first female to occupy that position in the history of KDOT. Patrick served on the civil engineering advisory council, or CEAC, from 2011-2017.



Marsha Meili ('81) is retired from a 37-year career with The Boeing Company and Spirit AeroSystems Inc. where she was a structural engineer and engineering manager. She is a Life Member of the Society of Women Engineers, or SWE, and has spent many years actively involved in STEM outreach and mentoring. She is also an active volunteer in her community. Meili has been serving on CEAC since 2019.



Vicki Scharnhorst ('82) serves as vice president for Tetra Tech in Denver, Colorado. She has managed work in federal, state and municipal government sectors, and performed private-sector projects and program management. She has served on the city of Boulder, Colorado, water resources advisory board, the Greenways advisory committee, K-State engineering advisory council and CEAC. Scharnhorst also received a master's degree in public administration and policy from American University.

Civil Matters talked to the three recently.

C.M. How did you choose the K-State civil engineering department?

C.P. Growing up in rural Kansas and having an agricultural background made K-State a fitting choice. The rewarding aspect of being involved with various civil infrastructure projects that people depended on every day was intriguing to me.

M.M. I started out in general engineering but ultimately chose civil. I had been thinking of civil engineering since I watched a sewer project being built in my hometown in north central Kansas during my high school days.

V.S. I have always had a great fondness for the natural environment and infrastructure work surrounding it. I felt the K-State CE program had the reputation, rigor and institutional capacity to further my educational and career goals.

C.M. What and who inspired you the most at K-State?

C.P. Two female engineering students and Professor Bob Smith — Dr. Smith inspired me to be a better student and engineer by challenging me to work harder. His continued praise of KDOT for the service they provide to the citizens of Kansas influenced my decision to have a career with KDOT.

M.M. SWE and Professor Jim Koelliker — I was able to connect with SWE early in my college experience. With few women studying engineering in the late 1970s and almost no women faculty members, it was intimidating for me. I liked that Dr. Koelliker always cared about his students. My fellow classmates, both men and women, helped one another with homework and projects.

V.S. Professor Jim Koelliker — he taught courses on water supply, hydrology and water quality that I took. As do many engineering students, I had had challenges early in my college years and was concerned about my ability to succeed. Dr. Koelliker was my advisor and reassured me. That little bit of encouragement from someone I respected made all the difference.

C.M. What CE design teams and/or campus organizations were you involved with? How was your experience?

C.P. ASCE student chapter — the best part was meeting other civil engineering students and learning more about the civil engineering profession.

M.M. SWE, ASCE and concrete canoe — these organizations connected me to other engineering students and future career opportunities. I lived on campus and the residence hall activities helped me make new friends outside of classes.

V.S. Concrete canoe — I met several fellow students that I had never met in class and it was a lot of fun. They taught me about concrete mix design and leadership, and I got to race the boat on Tuttle Creek Reservoir.

C.M. How did K-State prepare you for your career?

C.P. The “general” track gave me a broad exposure to all aspects of the CE profession. K-State provided a good solid foundation and the various upper-level classes fit the work I performed after college. I often referenced my design books early in my career.

M.M. I entered the aerospace industry right out of college so it was a bit different than some of the traditional civil engineering career paths. I soon learned that the teamwork that I experienced in college was very much a key part of working in industry.

V.S. K-State provided me with a robust understanding of civil engineering principles and problem solving. That foundation prepared me to do interesting work on behalf of civil society, work on multi-disciplinary complex projects and lead a group engineers and scientists to create extraordinary outcomes.

C.M. What advice do you have for young females considering a civil engineering major?

C.P. If you are interested in engineering, a civil engineering major offers a wide variety of career paths. Although there are far fewer female engineers than male, do not get hung up on the differences. Believe in yourself and just be yourself. Focus on what you bring to the profession.

M.M. Civil engineering is a very broad field and you can work in many industries over your career. You can certainly help make the world a better place no matter what you choose to do. Engineering is definitely an outstanding career choice for young women.

V.S. Go for it! I could have never imagined what doors this profession would open for me. I have worked on projects all over the world and I know that I have helped make the world a better place. You can do anything with an engineering degree – I know civil engineering graduates who have become, for example, water treatment experts as well as attorneys, teachers and entrepreneurs.

Alumna Elected to National Academy of Engineering



Cindy Wallis-Lage ('85) has been elected to the National Academy of Engineering — one of the highest professional distinctions accorded to an engineer. The honor recognizes Wallis-Lage, president of Black & Veatch's water business for advanced biological treatment, for her outstanding contributions to the state of the art. In her position, she

conceived the biological nutrient recovery in wastewater treatment processes and is responsible for leadership and management of the company's global water business that includes a workforce of more than 2,800 professionals worldwide. A licensed professional engineer, Wallis-Lage joined Black & Veatch in 1986 and progressed through the ranks prior to becoming president in 2012.

Recognized as a foremost expert in the treatment and reuse of water and wastewater resources, Wallis-Lage is a champion of the world's water resources, and advocates understanding water's true value and promoting its resilience so that communities may achieve their social, economic and environmental sustainability goals. She has authored or co-authored more than 50 papers, 20 technical articles and seven textbook chapters, and served as editor of the fifth edition update of White's Handbook of Chlorination and Alternative Disinfectants.

Wallis-Lage serves on several committees/councils/boards for various water industry associations such as the U.S. Water Alliance, Water For People, Water Research Foundation and WateReuse Association.

An active supporter of educational initiatives she has served on the civil engineering advisory council for K-State as well as its engineering advisory council. In 2013 she was named Alumni Fellow for the College of Engineering there.

Wallis-Lage also holds a Master of Science degree in environmental health engineering from the University of Kansas in 1990.



DEPARTMENT RESEARCH

WATER INFRASTRUCTURE PROJECT

Prathap Parameswaran, CE associate professor, led a team that will be funded by DOE for a water infrastructure project with the potential to reduce carbon emissions and water-treatment costs while improving water quality and equity of distribution nationwide.

Parameswaran's project, "Integrated Anaerobic Membrane Bioreactor Electro-assisted Fermentation Platform for Total Resource Recovery from Diverse Wastewaters," has been funded for nearly \$2 million over the next three years. Co-principal investigator is Stacy Hutchinson, associate dean of the Carl R. Ice College of Engineering. Other collaborators include Lawrence Berkeley National Laboratory, the University of Pittsburgh, the University of Kansas and CDM Smith.

The proposed anaerobic membrane bioreactor platform will demonstrate total resource recovery from swine wastewater to produce valuable chemicals, fertilizers and water for reuse. The proposed platform is expected to create an entirely new market spectrum within public wastewater utilities, livestock operations and food industries by transforming them into revenue-generating centers or biorefineries. Products generated will range from organic acids for use as food preservatives and bioplastics manufacturing, to ammonia-N as feedstock for the fertilizer industry or direct farm use as slow-release fertilizer, to tailored phosphorus fertilizers for appropriate soil types, stabilized biosolids for sustainable land application, and water for indirect reuse or discharge.



RURAL RAILROAD SAFETY CENTER NEWS

In 2019 the Federal Railroad Administration, or FRA, awarded K-State a grant to create the Rural Railroad Safety Center, or RRSC. The center currently operates under a \$3.9 million budget and has four strategic goals:

- To conduct and promote original and timely railroad safety research
- To develop a comprehensive unified railroad education curriculum to be delivered at all partnering universities to prepare a diverse workforce for the 21st century at both graduate and undergraduate levels
- To facilitate novel rail-focused outreach activities
- To disseminate research results and technology transfer to be used by the railroad

In 2020 the RRSC formed an industry advisory committee, which included Class I short-line railroads, private industry and the FRA, that awarded internal funding for nine research projects.

In addition to the FRA's federal investment in the RRSC at K-State, industry and private donors continue to be interested in the success of the rail center including providing funding for graduate student scholarships and graduate research assistantships, refurbishment of a structures and concrete laboratory for concrete tie research and development, the ability to purchase specialized equipment including a digital image correlator and scanning electron microscope, and creation of a railroad collaborative student learning center.



LONG-TERM LOADING OF CONCRETE

CE faculty members, Christopher Jones, associate professor and Bob Peterman, professor, have been awarded a three-year, \$418,161 grant from the Nuclear Regulatory Commission in support of its licensing activities and mission of providing reasonable assurance of safety from the 96 operating U.S.-based power reactors.

The project, “Addressing Technical Knowledge Gaps for Concrete Creep, Creep Recovery and Creep Fracture,” will be led by Jones and will develop analytical and computer modeling approaches to enhance understanding of the response of concrete to long-term loading. Long-term loading is primarily the prestressing force applied to the concrete to limit cracking and includes self-weight of the structure. Creep is additional displacement over and above the instantaneous displacement occurring in a loaded material over time. Excessive creep can lead to cracking and damage, but its most common manifestation is unwanted or excessive deflection of structural members; for example, a bridge droops undesirably low or a column gets shorter.

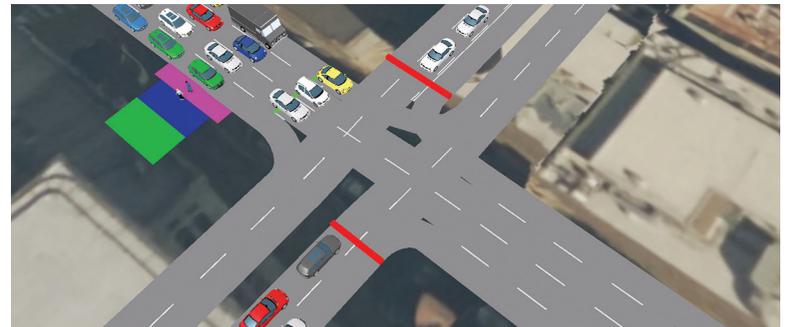
Recent findings have indicated creep deformation to be mostly irrecoverable for concrete and that the nature of the applied load, whether compressive, tensile or shear, profoundly influences the amount of creep observed. The influence of nuclear radiation on the creep behavior of concrete will also be investigated. The project aims to understand this phenomenon in a nuclear power reactor containment building.



CURBSIDE MANAGEMENT STRATEGIES

Shared-use mobility services and rising urban freight have made curbsides mobility hot spots for pickup and drop-off points, roadside deliveries, transit stops and private parking. Managing curbside space is critical for traffic authorities in cities to maintain the desired level of service, e.g., avoid blocking of through lanes by a ride-sourcing vehicle waiting to drop off, and revenue maximization from parking meters. Those managing the curbside must strategize to maximize space utilization and minimize disruption to incumbent traffic movement. Curbside management near signalized intersections poses even more complex situations, making it vital to quantify the congestion impact of curbside management practices and prioritize operational schemes.

A research group led by CE assistant professor Husain Aziz, director of the BHC Smart Cities Lab at K-State, is using a microsimulation approach to model curbside parking and stopping behavior of ride-sourcing vehicles on urban corridors. Using a simulation software, they are investigating curbside management strategies near select signalized intersections in Chicago where the curbside is mainly used for long-term parking of private vehicles. When spaces for private vehicles were removed, and a maximum of five designated parking spaces were provided for short-term parking specific to shared-use mobility — Uber, Lyft, and pickup-and-delivery services — average network delay was reduced by 14% and average speed of the traffic flow increased by 55%. The approach will next be applied to Kansas City, Missouri, metro areas.



A CURBSIDE MANAGEMENT SCENE NEAR SIGNALIZED INTERSECTIONS (ONE-WAY STREET) WITH A PICKUP/DROP-OFF LOCATION



STUDENT GROUPS

Engineers Without Borders

This year the K-State EWB chapter focused on three international projects: a kitchen project in Guatemala, and both well and irrigation water needs in Nicaragua. The kitchen was implemented and constructed in the 2020-2021 school year despite the team's inability to travel due to the pandemic. This was the final project in partnership with El Amate, Guatemala, where a school, latrine system and retaining wall have previously been built in the community. The assessment of a water project in Nicaragua was completed even though the community of El Cascabel was affected by natural disasters this year, bringing the partnership to the next step of implementation or renovation of a well to deliver safe potable water to the community of 250 people. The chapter also met its goal of beginning a third international project this past fall when a team of students began an irrigation project to help the Santiago Coyolito community in Nicaragua.

This school year the chapter was recognized by EWB-USA with the "Growing Stronger Together Award" for its contributions in helping surrounding EWB chapters in the region grow, as well as having internal growth and collaboration within the chapter itself.

EWB's mission contains two main goals: building a better world and developing leaders for that world.



Steel Bridge Team

The K-State Steel Bridge Team was scheduled to host the 12-team regional competition in the spring. However, COVID-19 forced AISC to pivot to an "on-campus" event where each school competed from home and submitted scores for evaluation. AISC also elected to use the same rules as the previous year since many schools were not able to complete fabrication of their bridge last year. The K-State team completed design of its bridge in the fall, fabrication of it in the spring and then had several days to practice the assembly before the on-campus competition.

In March the team competed from the Engineering Hall atrium in front of spectators viewing the timed bridge assembly and load testing. K-State Steel Bridge Team and CE alumni, Peter Clark and Rick Kreider, and Grant Lyons served as judges to attest that rules were followed and scores accurate. K-State placed second in the regional, qualifying for the National Student Steel Bridge Competition that also followed the on-campus model.

The team made adjustments to the design for improved constructability and refined the assembly process before the national event in May. The same judges returned to campus as monitors and the K-State Steel Bridge Team placed 17th nationally, which was highest among the three teams representing its region.



Chi Epsilon

K-State's Chi Epsilon Civil Engineering Honor Society finished the spring 2021 semester with a successful initiation of nine new members, which is a significant increase over previous semesters. Despite challenges from COVID-19-related restrictions on physical proximity while on campus, the chapter was well-connected and active, taking advantage of Zoom and other electronic communication tools. The officers led underclassman advising sessions in coordination with CE 015 meeting dates, which provided a setting for underclassmen to seek strategic advice from more senior students. Additionally the chapter continued in the tradition of service to the local community via the annual Adopt-a-Highway commitment along Highway 24 in conjunction with the ASCE student chapter. Chi Epsilon continues to seek new members and grow the impact of the chapter in the CE department and on campus.



Photo from 2019

ASCE

The K-State Student Chapter of ASCE held chapter meetings and CE 015 assemblies with guest speakers this past academic year with approximately 45 students attending in person, and another 100 either joining an online live-stream or watching a posted recording of the meeting. Rather than the traditional

bowling event in the fall semester due to COVID restrictions, social activities included several online trivia events. However, the bowling event was able to be held in the spring semester. Faculty co-advisors, Weston Koehn and Scott Schiff, continued to provide leadership and help students overcome COVID -19 challenges faced this past year.

The chapter hosted a virtual Mid-Continent Student Conference in mid-April as well as the ASCE Concrete Canoe competition, Mead paper competition and a business meeting. New ASCE officers, including Matthew Oszman, president and CE senior, are optimistic that next fall with the return of full in-person instruction, students will welcome the opportunity to be more engaged with ASCE and use it as an opportunity to supplement their in-class learning.

The ASCE Committee on Student Conferences and Competitions chaired by Scott Schiff was successful in getting approval from the ASCE board of direction to align student conference boundaries with ASCE regional boundaries. The K-State Student Chapter is now in a conference with other student chapters in Iowa, Kansas, Missouri and Nebraska.

ASCE Concrete Canoe Team

The K-State Concrete Canoe Team persevered through a strange year after not competing at all in spring 2020 due to the escalation of COVID-19. The 2021 regional competition was hosted by K-State civil engineering and held in Manhattan with virtual regional participation via Zoom. This year's competition did not involve construction of a full-scale canoe, nor did the team participate in races or the display competition. Enhanced focus-area papers were instead solicited and complimented the existing canoe design paper and oral presentation. The K-State team placed second in the region in the new enhanced focus-area competition and sixth overall. With only one graduating senior, the intact core of the K-State Concrete Canoe Team is excited to build on this year's success and realize its potential.



Graduate Student Profiles and Research

Harmful algal bloom monitoring at the Milford gathering pond



Emily Randig was first introduced to the field of environmental engineering during high school while working as a volunteer at the Bolsa Chica Wetlands in Orange County, California. The experience showed her firsthand the consequences of human activities on niche ecosystems and motivated her

to pursue a career solving pressing environmental issues. She completed her B.S. in civil engineering with an environmental emphasis at California State Polytechnic University, Pomona. Her time at Cal Poly inspired her to pursue an advanced degree in order to participate in cutting-edge research while further specializing in water resources engineering. Attending K-State is allowing her to gain new perspectives on water and environmental issues as she navigates water issues faced in both rural and urban settings.

Randig is currently working on developing analytical techniques to track, monitor and eventually predict harmful algal blooms, or HABs. She is advised by Prathap Parameswaran, associate professor. HABs are rapid and massive proliferations of a particular species of algae, and are a significant threat to water supplies, aquatic ecosystems, public health, economies and fisheries. While triggers that cause these blooms are not fully understood, nutrient enrichment of waters due to anthropogenic activities is recognized as a significant precursor. Consequently frequency and geographic distribution of HABs has increased in recent decades. Reliable prediction of algal blooms is challenging due

to the highly complex mixing and flushing patterns of source waters, and the chemical and biological interactions in aquatic ecosystems. Early warning of an impending algal bloom would allow for preventative intervention to mitigate the size and duration of the bloom.

The Milford Gathering Pond in Geary County has experienced yearly public health advisories and closures due to HABs. Randig has been conducting weekly monitoring of the pond in order to track changes in water chemistry before, during and after a HAB outbreak. Parameters measured include pH, turbidity, temperature, carbon, nitrogen and phosphorus. She is also using excitation emission matrix fluorescence spectroscopy, a novel technique, to rapidly characterize organic matter in aquatic ecosystems. Her research aims to predict algal blooms based on changes in intensity of organic matter observed.

Quantification of air-void structure in fresh concrete

Ragini Nikumbh, a CE doctoral student, joined the research group of Christopher Jones, associate professor, in 2018. Her strong interest in material properties inspired her to develop statistical models with a potential to be used as quality control/assurance tools. This will enhance the life of concrete pavements and in turn play a key role in ensuring sustainable construction practices.

Although substantial work has been done to enhance and measure the strength of concrete, assessing durability of concrete pavements remains a major issue. For combating freezing and thawing degradation, entrained air voids and use of good quality aggregates helps ensure its durability, but the current practices have shortcomings for real-time quality assurance. The entrained air-void structure through the cementitious paste is difficult to measure in fresh concrete and a more rigorous representation is obtained only after hardening, usually after about 28 days. With this in mind, Nikumbh has been using statistical analysis



and tools to develop predictive equations to accurately predict the hardened spacing factor between air voids in fresh concrete. This was developed using parameters measured in fresh concrete in conjunction with mixture design parameters in real time, which has been documented in a research article

currently under review for publication. Furthermore, she plans to evaluate the accuracy of these equations for evaluating the freeze-thaw durability of the concrete mixtures. Since air-void parameters quantified in hardened concrete using the ASTM C457-16 method are biased toward the settings provided by the user, she is additionally working on developing a calibration system for the C457 measurement system.

During her research she has worked alongside KDOT officials on-field to collect data in real time and compare it with results obtained in laboratories. She is a recipient of the John A. Angold Graduate Engineering Scholarship in academic years 2019-2020 and 2020-2021. Nikumbh presented her research during the ACI spring conventions in 2019 and 2021 and the Scholer-Peterson spring 2020 concrete conference, as well as the TRB 2021 conference.

After graduation Nikumbh plans to pursue her passion for this versatile material, and work closely with or within the construction industry in devising measures to improve current quality control/assurance techniques.

Undergraduate Research



Sam Anderson, CE senior, worked with Eric Fitzsimmons, CE associate professor, in the Transportation Engineering Lab the last three years as an undergraduate research assistant where, along with graduate students, she examined transportation work zone safety.

One project dealt with evaluating effectiveness of dynamic speed feedback signs in work zones on high-speed Kansas roadways. Work zones are essential to keeping roadways preserved through reconstruction to ensure safety and efficiency, but tend to increase safety risks due to changes they bring to normal driving conditions. To lower these risks, reduced speed limits are used throughout work zones. These can lead to a large displacement of vehicle speeds across a work zone site, which can increase traffic congestion, delay times or crash risk if proper signage is not used.

In her study Anderson evaluated three work zone sites in Kansas. Work zone 1 on northbound I-35 north of Ottawa compared the accuracy of tracing vehicles manually versus a computer program. Work zones 2 — also on northbound I-35 north of Ottawa — and 3, on southbound US-75 north of Topeka, included evaluation of the dynamic speed feedback sign. Her analysis found speed reductions in work zones 2 and 3, with work zone 3 showing the most consistent reductions. Overall, effectiveness of the dynamic speed feedback sign was found to be inconclusive due to inconsistencies between the two work zones. Anderson presented her results virtually for the 2021 Annual Meeting of the Transportation Research Board.



AWARDS AND ACCOLADES

FACULTY

Eric Fitzsimmons, associate professor, was recipient of the 2020 *Council of University Transportation Centers (CUTC) – Cambridge Systematics New Faculty Award*. He also won the 2021 *Norman Cook Chi Epsilon Undergraduate Teaching Excellence Award*.

Krishna Ghimire, teaching assistant professor, won the “Above and Beyond” *Instructor Award* from the CE department.

Mustaque Hossain, professor and department head, was recipient of the 2021 *ASCE Region 7 (Kansas, Colorado, Wyoming, South Dakota, Nebraska, Iowa, and the St. Louis and Kansas City areas of Missouri) Lifetime Achievement Award*.

Joeongdae Im, assistant professor, was named *Jeffrey and Joy Lessman Keystone Research Scholar* by the Carl R. Ice College of Engineering.

Weston Koehn, teaching assistant professor, won the 2021 *Norman Cook Chi Epsilon Award for Excellence in Advising*.

Hani Melhem, professor, was named the *Richard B. and Mary Jo Myers - Carl and Mary Ice Cornerstone Teaching Scholar* by the Carl R. Ice College of Engineering. He also won the *Professorial Performance Award* from K-State. He received the 2021 *ASCE Region 7 Outstanding Faculty Award*.

Prathap Parameswaran, associate professor, won the 2021 *Outstanding Graduate Faculty Award* from the civil engineering graduate student council.

Scott Schiff, teaching professor, was named recipient of the 2020 *ASCE Region 7 Outstanding Faculty/Practitioner Advisor Award*. He also was voted the 2021 *Bob and Bernita Thorn ASCE Outstanding Faculty Member* by the ASCE student chapter.

STUDENTS

Samantha Anderson, senior, was elected to the *Steel Ring Engineering Honor Society* of the Carl R. Ice College of Engineering.

Ellis Baughan, senior, was awarded the 2020/2021 *Clarence W. Smith Memorial Scholarship* of the Kansas County Highway Association.

Weston Boyer, senior, was awarded the 2020/2021 *Clarence W. Smith Memorial Scholarship* of the Kansas County Highway Association.

Sarah Carr, senior, was awarded the *Eugene C. Figg Jr. Civil Engineering Scholarship* from the ASCE.

Mariana Cruz, senior, won the 2021 *Vernon H. Rosenbraugh Award for Outstanding Service* to the K-State student chapter of ASCE. She was voted by the Carl R. Ice College of Engineering students as the 2021 *Saint Patricia*. She also was recognized by the National Action Council for Minorities in Engineering at a virtual ceremony.

Joe Drilling, senior, was voted by the CE faculty as the spring 2021 *Bartlett & West Outstanding Graduating Senior*. He also won the 2021 *Knights of St. Patrick Award* from the Steel Ring Engineering Honor Society in the Carl R. Ice College of Engineering.

Priyasha Fernando, master’s degree student, was selected by the audience as the People’s Choice winner for her presentation, “Power of Pig Poop,” during the annual 3-Minute Thesis Competition organized by the K-State Graduate School.

Derek Kratzer, junior, won the 2020/2021 *Spenser Delamater Scholarship* from the ASCE Wichita Branch. He also was voted as the *Bartlett and West Outstanding Junior* in spring 2021 by the CE faculty.

Alyssa Wherry, senior, was winner of the 2021 *Knights of St. Patrick Award* from the Steel Ring Engineering Honor Society in the Carl R. Ice College of Engineering.

SCHOLARSHIP NEWS

UNDERGRADUATE

During the last academic year, CE students received record-breaking amounts of scholarship money — important not only to recruit new students but also to retain current students. A recent survey of admitted engineering students choosing not to attend K-State showed net cost — cost of attendance minus scholarship amount — as the No. 1 reason behind not attending K-State. During AY 20-21, 114 scholarships worth \$286,493 were disbursed to 84 CE students from university, college and departmental sources. Among those 11 were Putnam scholars — a premium scholarship offered by K-State, two were University Distinguished Scholars and three were Engineering Leadership and Innovation awardees. Other scholarships were mostly sponsored by alumni and ranged in value from \$500 to \$7,500. The large number of departmental scholarships shows the generous support of CE alumni.

GRADUATE



Three graduate students in civil engineering, Ragini Krishna Nikumbh, Poornima Patil and Arash Saeidi Rashk Olia, received John A. Angold Engineering Scholarships established by Art Grix Jr. and Linda Angold Grix of Gold River, California,

in memory of John A. Angold, 1938 K-State graduate in electrical engineering who retired after nearly 42 years at the Atchison, Topeka and Santa Fe Railway. Recipients must be graduate students in good standing at the university and majoring in any curriculum within the College of Engineering. Their area of study must relate to the railroad industry, transit or transportation, with railroad industry-related applicants receiving priority.

NEW FACULTY AND STAFF



Greg Newmark has joined CE as a research associate professor. He has a doctoral degree in city and regional planning from the University of California, Berkeley. His prior teaching and research experiences include the University of Chicago, DePaul University, San Jose State University, Center for Neighborhood Technology - Chicago, Regional Transportation Authority - Chicago and Israel Ministry of Environmental Protection. Most recently he was a faculty member in the department of landscape architecture and regional and community planning at K-State. His areas of specialization include transportation planning, travel behavior, sustainability and urban data analysis. He will serve as principal or co-principal investigator in upcoming projects sponsored by KDOT and the Federal Transit Administration.



Andrew Schoenecke, E.I.T, has been hired as a research technologist. He graduated with a B.S. in engineering from John Brown University in Siloam Springs, Arkansas in 2019. There he was the IEEE student branch representative and president, a jazz/pep band member and received the Exceptional Innovation Award during graduation. Most recently he had been the corporate electrical engineer for Webco Industries in Sand Springs, Oklahoma. Schoenecke brings a variety of software and hardware skill sets to the position.



Kelli Park Fuhrmann has been hired as an event coordinator for CE and will be responsible for planning conferences for the department. Prior to this she had been with Global Campus where she planned conferences, institutes and training for the Carl R. Ice College of Engineering. Fuhrmann has a B.S. degree from K-State.



Advisory Council News

New members

The CE department will add two new advisory council members for a three-year term effective fall 2021.

Chris Covert ('73, M.S. '75) served as president, chief executive officer and executive vice president for two Fortune 500 engineering and construction companies, including president and chairman of the executive leadership committee for Northwest Redwater Partnership, a \$10-billion energy company in Alberta, Canada. He has more than 45 years of experience in worldwide project management for major upstream and downstream process facilities and mega government projects.

Warren K. Ray ('68) is the founding vice chancellor of global and strategic partnerships at Missouri University of Science and

Technology. He also served as interim chancellor and provost there. He had held prior positions at Michigan Technological University, Ohio University and Texas Tech University.

Ahern named ASCE life member

John H. Ahern ('73) has been selected as an ASCE Life Member. He has a record of distinguished service on the K-State civil engineering advisory council from 1996-2002, 2009-2012 and 2012-2015. He recently retired as vice president of engineering at EvapTech, Inc., Overland Park.

2020-2021 CE Advisory Council Members

Karen Becker
City of Manhattan

Andy Buessing
Hutton Construction

Kevin Day
Canadian National Railroad

David Jacobson
Kansas Turnpike Authority

Rick Kreider
Kansas Department of Transportation | Retired

Andrew Wiederholt
Bartlett & West

Marsha Meili
Spirit AeroSystems | Retired

Cathy S. Ritter
Constellation Design Group Inc.

Burt Morey
Kansas Department of Transportation

Joe Surmeier
Professional Engineering Consultants

Scott Uhl
Professional Engineering Consultants

Gary Wurdeman
Pablo Energy LLC

Letter from the chair

The past year has been challenging for many people across the world and that was no different for the civil engineering department at K-State. The civil engineering advisory council, or CEAC, would like to thank the CE department faculty and staff for successfully navigating through these tough times, graduating students on time and continuing to work on excellent research projects that make a difference throughout the world. As we make progress on moving past COVID, the future looks bright. The incoming freshman class numbers are promising, current placement rate is at an all-time high, the engineering funding initiative has been renewed by the state of Kansas, and department staff and faculty are dedicated to making a difference in the lives of civil engineering students.

For those unfamiliar with the CEAC, we provide a link with the practicing profession and are devoted to assisting the department in providing the highest quality of education to civil engineering students. We offer input on curriculum, assist with faculty recruitment, engage in student activities, provide support with ABET accreditation and help develop research and technology transfer. Our council consists of 12 practicing engineers committed to the advancement of engineering at the university. A large part of our activities involve directly supporting the CE department head, who is an ex-officio member of the council.

A few of the issues we are focused on this year include developing new program educational objectives for ABET accreditation, generating funding for the department and curriculum review. Understanding adequate funding is necessary to attract and maintain top-level students, faculty and facilities, the CEAC is actively involved with identifying funding sources and educating alumni on the needs of the department.

A key function of the council is to review the current curriculum and ensure the coursework matches the needs of industry, so that students are better prepared and ready to contribute when they graduate. Comments from our most recent review have been integrated into the new curriculum the department has adopted starting in fall 2021.

The CEAC is focused on supporting improvement of our civil engineering department and is passionately involved in advancing engineering at K-State. Thanks to each of you for representing and supporting our department and K-State. Feel free to reach out to any of our advisory council members or the department if you're interested in getting more involved.

All the best for a great rest of the year, and Go Cats!

- **Kevin Day**, *Canadian National Railroad*

Professional Progress Award



Kevin Day (2000) received the 2021 Professional Progress Award from the Carl R. Ice College of Engineering. He is currently assistant vice president - track, eastern region, with the Canadian National Railway in Highland, Indiana. He leads the track infrastructure team performing maintenance and capital programs across the U.S. and eastern Canada. He has been with the railway company

for more than 18 years and served in a number of positions of increasing responsibilities. He has a master's degree in civil engineering from the University of Illinois in Urbana-Champaign, is a licensed professional engineer in the state of Mississippi and serves on the advisory council of the civil engineering department at K-State. Day is a 1995 graduate of Manhattan High School.

DEPARTMENT IMPROVEMENTS AND NEWS

PROGRAM ACCREDITATION

The civil engineering faculty and advisory council have recently adopted a new set of program educational objectives, or PEOs, and student outcomes, or SOs. PEOs are broad statements that describe what graduates are expected to attain within a few years after graduation and are based on needs of the program's constituencies.

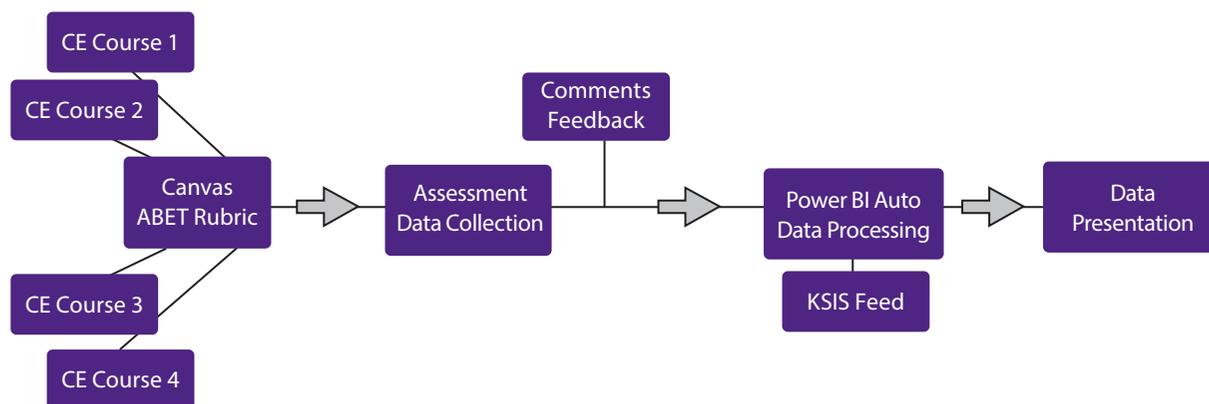
- Graduates will be successful in their graduate studies and/or civil engineering careers.
- Graduates will pursue professional development, registration and certifications as appropriate for their careers with an ability to pursue leadership positions.
- Graduates will have the skills to effectively function in diverse, inclusive and innovative teams to solve open-ended engineering challenges with due consideration of social, ethical and economic impacts as well as global sustainability.

SOs describe what students are expected to know and be able to do by the time of graduation. The CE program will enable students to attain seven SOs — all provided by the Accreditation Board for Engineering and Technology, or ABET, and adopted by the CE faculty through voting.

NEW ASSESSMENT PROCESS

The CE faculty will use Microsoft Power BI in the course assessment process for facilitating continuous improvement of the CE curriculum as required by ABET. Power BI is a business analytics service that provides interactive visualizations and business intelligence capabilities. The process is being spearheaded by Krishna Ghimire, teaching assistant professor, and assisted by other members of the ABET assessment team — Scott Schiff, teaching professor and Weston Koehn, teaching assistant professor.

To evaluate attainment of student outcomes, a set of rubrics for all seven SOs has been created in Canvas, a course management system. The rubrics consist of four levels of student achievement: advanced, proficient, developing and unsatisfactory. These achievement levels facilitate implementation of remedial measures to address gaps in student learning. Individual instructors can integrate the rubrics into their course by aligning them with assignments to assess related SOs. While grading those assignments, individual student achievement level can then be scored. The scores are automatically sent to Power BI for further analysis. Power BI incorporates any updates in assessment records, and integrates student data and renders it in presentable form. The department plans to use this platform to continuously monitor the efficacy of the CE curriculum.



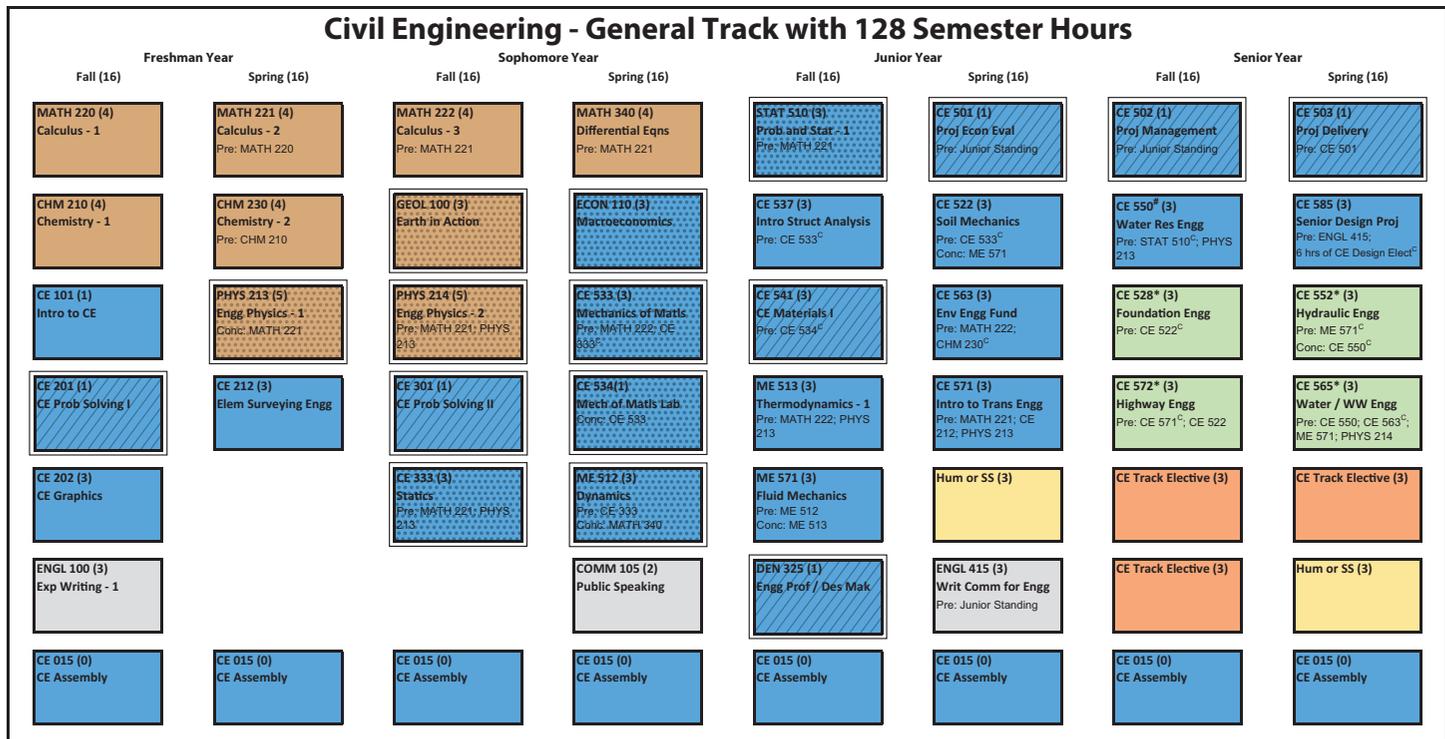
CURRICULAR IMPROVEMENT

Last academic year, the civil engineering faculty and civil engineering advisory council, or CEAC, approved an updated curriculum effective fall 2021, a result of years-long feedback from graduating seniors as well as CEAC. This was the first major revision of the curriculum in nearly 20 years and was considered to be long overdue. The curriculum evenly distributes 128 hours of coursework into eight semesters of 16 hours each. The changes were spearheaded by Scott Schiff, CE teaching professor and undergraduate program director.

The main objective of this curriculum revision is greater relevancy and easier transition to the CE profession. The new curriculum introduces two, one-hour Excel- and Mathcad-based courses to emphasize using these programs as engineering problem-solving tools and discontinues the “C++” programming course (3 credit

hours). The Civil Engineering Materials Course is now required for all CE students, instead of being a track elective course. Three one-hour courses – Project Economic Evaluation, Project Management and Project Delivery, were added to satisfy the recommendation of teaching project management skills to civil engineering students. Finally the curriculum requires a one-hour class of engineering professionalism that will also cover ethics. Room for the new courses was created by eliminating three track elective hours and three humanities/social science hours.

The figure below shows the new flowchart for the general track. New courses have diagonal lines over the background color and repositioned courses have dots over the background color.



View the flowchart in full detail at ce.k-state.edu/undergrad/advising.

Congrats, 2020-2021 graduates!

SPRING 2021 B.S. GRADUATES

Marc Jordan Almloff
Hussain Ali M. Alsadiq
William Richard Bax
Payton Elizabeth Best
Steven Joseph Boehmer
Weston Stillman Boyer
Mariana Cruz
Nolan August Dresher
Joseph Robert Drilling
Seth Hensarling
Caleb Kile
Sarah Elizabeth Knight
Kaden Michial Lewis
Stephen Alexander Link

James Luther McMackin
Aaron Randolph Moore
Lucas Gabriel Nunez Da Silveira Van Caester
Kyle Parr
Enrique Salas
Jacob Schmitz
Aubrey Brooke Smith
Seth Ryan James Walker
Evan Garrett Weninger
Alyssa Lauren Wherry

FALL 2021 B.S. GRADUATES

Isabelle Mackenzie Aube
Zane Beattie
Auston Randall Bevins
James Brett Brickell
Drew David Fitzgerald
Alexander Michael Griffin
Kyle William Hultgren
Tommy Hunter
Benjamin Thomas Koetting
William Shannon Radnor

Francisco Rudolpho Ramirez
James Reche
Michael Addison Robertson
Ryan Christopher Rogowski
Conrad Joseph Sandoz
Nicolas Jesus Ezequiel Sotelo Gonzalez
Raul Rodrigo Vera Parzajuk
Timothy Bryan Wilkerson
Alexis Denne Wilson

PH.D. GRADUATES AND DISSERTATIONS

Kimberly Waggle Kramer — major professor, Hayder Rasheed

Dissertation: Load-deflection response of prestressed concrete beams strengthened with FRP: a comprehensive perspective

M.S. GRADUATES AND MAJOR PROFESSORS

Louis Braun
Christopher Chiu
Kathryn Douglass
Evan Joseph Heronemus
Derek Hrubes
Todd Kindred
Donald Lee Powers
Mitchell Titus
George Daniel Wuertz

Dunja Perić
Prathap Parameswaran
Jeongdae Im
Prathap Parameswaran
Stacey Kulesza
Sunanda Dissanayake
Scott Schiff
Hani Melhem
Scott Schiff

In Memorium



Tanweer Hasan (Ph.D. '98), the first transportation engineering doctoral graduate, passed away in Hartford, Connecticut, on Feb. 27, 2021. The late Bobb Stokes was his major professor. Born and raised in Bangladesh, Hasan came to K-State in 1994. After graduation he continued his employment with the Bangladesh University of Engineering and Technology and rose to the rank of professor. He was the director of the

Accident Research Institute there. Hasan also taught at King Abdulaziz University, Saudi Arabia, and had had a visiting academic appointment at Loughborough University, U.K. At the time of his passing, he was working for the Connecticut Department of Transportation.

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Revised Aug. 29, 2017.

Chi Epsilon, 1960



ASCE Student Chapter, 1947



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