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2020 marks record year of engineering graduates for Kansas State University

While 2020 will be remembered on many fronts, largely related to a global pandemic, the Carl R. Ice College of Engineering at Kansas State University has marked the year in celebratory mode by recording its largest-ever number of graduates and the most of any engineering school in the state.

In awarding a total of 782 bachelor's degrees from spring, summer and fall 2020 graduation classes, the college exceeded its previous record-setting years of 2017 with 630 graduates, 2018 with 684 and 2019 with 719.

When looking for an impetus or reason behind this surge in numbers, a good place to start is the college's response to and benefit from the University Engineering Initiative Act, or UEIA, enacted by the Kansas Legislature in 2011 to increase the number of engineering graduates from the state's three engineering schools to 1,365 students per year by 2021. The goal for the Carl. R. Ice College of Engineering was 587 graduates per year by 2021, a number it first exceeded in 2017, year six of the 10-year program.

During this time period, each engineering college was required to provide a one-to-one match from non-state sources, or $3.5 million per year for each school, for a total match of $105 million over the 10 years in support of engineering education programs. The initiative ends in 2021 unless it is renewed by the current Kansas Legislature.

"The college's response to the UEIA has been nothing short of remarkable," said Matt O'Keefe, dean of engineering and LeRoy C. and Aileen H. Paslay chair in engineering at K-State. "This investment by the state legislators targeting engineering education efforts was met by our implementation of enhanced recruitment and retention programs to increase the size of the student body and support student success.

"In addition, we leveraged the funds to increase our facility size by more than 100,000 square feet of new space for classrooms, laboratories and student design team areas, as well as adding to the number of faculty serving our students."

The initiative directed the secretary of the Kansas Department of Commerce to work with the Kansas Board of Regents, as well as the three state universities, to develop a plan to target engineering education efforts to fuel economic growth and business success in Kansas.

"Demand for our graduates remains strong, with our record-setting class of 2020 continuing the tradition of a high percentage either employed or seeking additional professional education," O'Keefe said.

Rural Education Center receives NSF grant focusing on drones and geoscience careers

The Rural Education Center in the Kansas State University College of Education has received a $340,000 National Science Foundation grant for using drones and other technology to encourage rural students'

interest in geoscience degrees and careers.

"SOARING: Sharing Opportunities, Approaches, and Resources in New Geo-teaching" is a three-year grant that will provide training on the latest in geotechnology for teachers and students at middle schools and high schools in eight partner rural school districts. It will target geotechnology applications of airborne remote sensing in the areas of environmental and hazardous geology, water resources and geology mapping.

According to current data, Project SOARING will likely reach more than 4,400 middle and high school students in Kansas, including more than 1,900 female rural students, 2,200 Hispanic/Latino rural students and more than 200 students underrepresented in STEM fields. School districts involved are Ashland USD 220, Clay County USD 379, Dighton USD 482, Haviland USD 474, Lakin USD 215, Liberal USD 480, Skyline USD 438 and Twin Valley USD 240, all members of the Rural Education Center's newly established Rural Professional Development School network.

"Jobs in education and agriculture are two staples in rural communities and the possibilities are increasing because of this technology," said Debbie Mercer, dean of the K-State College of Education. "Project SOARING is the Rural Education Center's latest multidisciplinary initiative to help rural communities protect their greatest natural resource: their young."

Spencer Clark, associate professor of curriculum and instruction and Rural Education Center director, is the grant's principal investigator. Co-principal investigators are Lori Goodson, assistant professor of curriculum and instruction and Rural Education Center assistant director; Aida Farough, teaching assistant professor in the K-State geology department; and Shawn Keshmiri, professor in the aerospace engineering department at the University of Kansas and faculty/researcher with the KU Center for Remote Sensing of Ice Sheets.

"Our Rural Education Center is always looking for ways to bring innovative career awareness and exploration to rural schools in Kansas," Clark said. "This is a very exciting project because not only does it involve teachers and students, it will also expose students to possible career opportunities they'd never considered."

Each year of the grant, nine teachers, accompanied by student apprentices from their schools, will participate in summer training on the KU campus and then teach middle schoolers on the K-State campus. A key element for Project SOARING is the Summer STEM Institute, a successful partnership between Manhattan-Ogden USD 383 and the K-State College of Education. Recently completing its 10th summer, the STEM institute serves around 325 students with a variety of STEM courses. The nine teachers selected for Project SOARING will also teach content at the institute.

Goodson said she is especially excited to see two of her main areas of interest — providing additional opportunities for rural teachers and students, as well as exposing more people to the Summer STEM Institute, which she has coordinated for the past seven years — converging for this project.

"The Summer STEM Institute is an incredible experience for middle schoolers, teachers, and our pre-service teachers who assist with the various classes," Goodson said. "Through Project SOARING, we can expand the institute's reach and impact by including rural students in this opportunity."

University-licensed compound selected as candidate against COVID-19

Computer science initiative expands programming fundamental offerings to small colleges, high schools

As the pandemic continues, hope is in sight with the production and distribution of new vaccines and treatments. Kansas State University is continuing to help in the fight with a licensed technology against coronaviruses, including SARS-CoV-2, the virus that causes COVID-19.

Cocrystal Pharma, a clinical-stage biotechnology company, recently announced that a series of broad-spectrum protease inhibitors developed at K-State and licensed through K-State Innovation Partners in April 2020 has been selected as a preclinical lead compound for further development.

The licensed protease inhibitors were developed by Kyeong-Ok "KC" Chang and Yunjeong Kim, virologists in the K-State College of Veterinary Medicine, in collaboration with William Groutas at Wichita State University and Stanley Perlman at the University of Iowa.

"The current FDA-approved drugs for COVID-19 have different mechanisms of action," Kim said. "Further studies are required to reveal the therapeutic potency of our protease inhibitor compared to other approved drugs. Drugs targeting different virus proteins are often combined to maximize their efficacy, so it is always nice to have a repertoire of drugs that work in different ways."

Preclinical animal studies of these K-State coronavirus compounds published in the prestigious medical journal Science Translational Medicine showed in vivo efficacy against Middle Eastern respiratory syndrome, or MERS, a related deadly human coronavirus infection, in a mouse model. Further testing allowed Cocrystal to identify this promising candidate for preclinical lead development for COVID-19. According to the company, there is significant potential for delivering this compound either for injection or inhalation and for potential use as both a therapeutic and prophylactic, protecting uninfected individuals who may become exposed.

With the selection of this candidate, the company will initiate studies to evaluate potential toxicity risks and conduct safety pharmacology studies before the phase 1 clinical trial.

"It is very exciting to see the basic research from Drs. Chang and Kim and their colleagues translated into drug development to fight COVID-19," said Beth Montelone, K-State interim vice president for research.

This is one of several new technologies that K-State has licensed to corporate partners to combat the disease. Additionally, more than $7.7 million in contracts for COVID-19 research at K-State have been secured.

"Long before COVID-19 came along, we worked collaboratively on protease inhibitors for important human and animal viruses, such as MERS, human norovirus and feline infectious peritonitis, a deadly feline coronavirus infection — some of which are also under commercial development," Kim said. "So, we think that our research, along with other high-impact COVID-19-related research currently going on at Kansas State University by many different laboratories, shows our strengths as a research institution."

An initiative by Kansas State University could soon bring university computer programming courses to high schools and small colleges across the state, providing students with an in-demand job skill.

K-State's Computational Core Initiative, offered by the computer science department in the Carl R. Ice College of Engineering, is a set of programming courses designed to provide students of any major with the fundamental knowledge to utilize programming in a variety of situations. The initiative's courses focus less on programming theory, so advanced mathematics classes such as calculus are not required — college algebra is sufficient to take the courses.

"Programming is the skillset that makes students stand out in the 21st century job market," said Scott DeLoach, professor and department head of computer science at K-State. "Using computers to solve problems is a key part of the modern, technology-driven workplace."

While the initiative's original goal was to integrate computer science classes into other degree programs offered at K-State — which has happened with a certificate program offered and a new integrated computer science degree — the initiative's vision has expanded.

Through the Computational Core Initiative's Academic Partners Program, K-State computer science courses have seen enrollment success at Manhattan Christian College this spring, with upcoming plans to offer the courses to more small colleges regionally.

The Computation Core Initiative is multifaceted in that it uses the same basic courses to make computer science available to non-computer science majors online, on campus and throughout the region at smaller colleges lacking resources or expertise to offer their own classes in this area, DeLoach said.

At the high school level, the initiative's Cyber Pipelineprogram was piloted at Manhattan High School in fall 2020 with 18 students enrolled in the first course through a hybrid setup. The students learned online but also had a teacher in their classroom to help with questions. Enrollment for the spring semester is at 12 students, all attending class in person. Both Manhattan High School and Basehor-Linwood High School in Leavenworth County have signed onto the program for the 2021-2022 school year.

"Our vision is for computer science to be taught in all high schools in Kansas at no cost to the students," DeLoach said. "Right now we are projecting a $100 cost to school districts for each student in a yearlong course. In the coming years we are expecting even more high schools across the state will be on board, with possibly even a Missouri high school now that K-State is offering in-state tuition to Missouri residents."

DOD funds research to expand development of form-fitting circuitry

The Radiological Systems Integration Laboratory at Kansas State University, in partnership with Radiation Detection Technologies Inc., has been awarded a nearly $1 million contract from the U.S. Department of Defense Threat Reduction Agency to produce more compact and form-fitting circuits than can be achieved

Online degree programs recognized for excellence in latest U.S. News and World Report rankings

Kansas State University's online portfolio of programs was recognized for excellence in 12 categories in the 2021 U.S. News and World Report, released this month.

K-State's U.S. News & World Report program rankings for 2021 include:

- Online bachelor degrees, with 18 degree options — No. 48 nationally, No. 32 for veterans.
- Engineering online graduate degree programs, with nine degree options — No. 34 nationally, No. 19 for veterans.
- Master of Software Engineering program — No. 47 nationally.
- Online master's degrees in education — No. 46 nationally, No. 14 for veterans.
- Educational administration program — No. 27 nationally.
- Master's in curriculum and instruction — No. 10 nationally.
- Master's in special education, launched in 2020 — No. 12 nationally.
- Professional Master of Business Administration — No. 35 nationally, No. 22 for veterans.

"We are pleased with these rankings and especially proud that the online bachelor degree programs received the highest mark of any school in the state of Kansas," said Karen Pedersen, dean of K-State Global Campus. "Our programs continuing to rank among the nation's best is indicative of our commitment to lead the way in online education in Kansas."

In creating its rankings, U.S. News and World Report analyzes program effectiveness in a variety of ways, including student engagement, admissions selectivity, peer reputation, faculty credentials and training, and student services and technology. Online programs are also ranked for how effectively they serve veterans.

with printed circuit boards.

Heading the two-year project is Walter McNeil, assistant professor in the Alan Levin Department of Mechanical and Nuclear Engineering at K-State, where the portion of funding for the study, "Discrete 3D Electronics for Radiation Detection Systems," will be $640,931.

McNeil directs the Radiological Systems Integration Laboratory that develops radiation-sensing systems, mechanical and electronic technology, and innovative sensing instrumentation that can be used in remote and rugged environments.

"But the focus for this funding opportunity," McNeil said, "will be the miniaturization and portability of these form-fitting circuits, which are critical for military, domestic security and human health monitoring."

The work will incorporate the 3D printing of electronic circuits using discrete electronic components to form the unique circuits. The concept will be applied to advanced mobile radiation-detection systems that contain low-noise, high-gain and high-voltage analog circuitry, along with high-speed digital processing tools having algorithmic capability.

To execute a 3D circuit layout, a $330,000 machine will be employed that combines 3D printing with traditional pick-and-place circuit board fabrication tools. The goal will be to create a prototype radiation-detection system for gamma ray and neutron detection that leverages 3D electronics to reduce size, weight and power.

The research will educate students and advance the technology used primarily for emergency response personnel in radiological incident response as well as military applications. In turn it will expand the infrastructure to create capabilities in advanced manufacturing.

DID YOU KNOW?

More than 90 Kansas State University faculty members were listed as being in the top 2% of researchers in the world, according to a 2020 studydone by Stanford University.

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