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Kansas State University awarded \$2.65 million to study water, plant and soil microbiomes

Sometimes looking at small things helps answer big questions. The challenges of feeding a growing population while minimizing environmental problems, for instance, could be addressed by advancing understanding of interactions between groups of tiny microorganisms.

Two Kansas State University distinguished professors will lead an interdisciplinary university team collaborating with four other Kansas universities on a new [\\$20 million project funded by the National Science Foundation](#) to investigate how these microbiomes of aquatic habitats, plants and soils - known as MAPS - can enhance agricultural productivity, mitigate environmental problems and conserve native grasslands.

The work is funded through the National Science Foundation Established Program to Stimulate Competitive Research (EPSCoR) which aims to build research and development capacity. The award will be administered by the University of Kansas and includes research partners from Wichita State University, Fort Hays State University and Haskell Indian Nations University.

The Kansas State University group will receive \$2.65 million of the total award. Walter Dodds, university distinguished professor of biology, and Chuck Rice, university distinguished professor of agronomy, are the university's project leaders. According to Dodds, advances in genomic sequencing are driving advances in the emerging field of microbiome science.

One area the K-State group will investigate is how microbes associated with water quality differ in cropland and natural grassland, and how those microbes wash into water and, for example, make it more susceptible or resistant to harmful cyanobacteria blooms that can make people sick. Another area of inquiry will be how the precipitation gradient across the state affects the soil microbiome, how agriculture affects the soil microbiome, and how innovative practices in agriculture can help sustain or improve soil health through the microbiome.

"The unique approach is that we're looking in-depth at microbes associated with the plants, the soil they're in and water, and how they interact with each other across those habitats," Dodds said.

The microbiome is a hot topic, and Rice said the project places Kansas at the forefront of research efforts. Many efforts are looking at one MAPS component instead of considering all three.

"The public is familiar with the gut microbiome and the human microbiome," Rice said. "By adopting a One Health approach and understanding the microbiome from soil to plant, animal and human microbiomes, we hope we can increase awareness and understanding of the importance of those microbiomes to the environment."

APDesign receives top rankings from DesignIntelligence

[Kansas State University's College of Architecture, Planning & Design \(APDesign\)](#) graduate programs in architecture, interior architecture and landscape architecture are once again among the best in the nation, according to annual rankings by [DesignIntelligence](#), the only organization ranking accredited professional programs in architecture, landscape architecture and interior design/architecture.

This year, the graduate program in [landscape architecture](#) ranked fifth in the nation overall and second among programs at public institutions. The graduate program in [interior architecture](#) ranked sixth nationally and first among programs at public institutions. The graduate program in [architecture](#) ranked 18th in the nation and eighth among programs at public institutions.

DesignIntelligence's rankings are based on surveys from 1,923 hiring professionals, 111 deans and department chairs, and 4,359 students in the design disciplines. The primary query of hiring professionals used to conduct the rankings is, "From your hiring experience during the last five years, which programs are best preparing students for a future in the profession?" Deans and department chairs were asked what programs they most admire and students were surveyed on their satisfaction with the educational institution in which they are currently enrolled or graduated from in the past year.

Taken as a whole, APDesign finished as the most prominent college in the rankings given its housing programs across the entire spectrum of design.

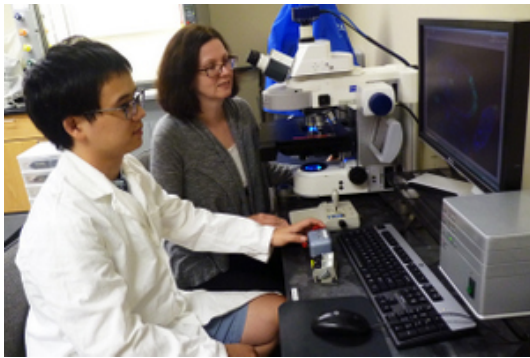
DesignIntelligence also ranked the graduate program in interior architecture as the third most admired program in the nation among educational administrators, citing its, "Efficient five-year Master of Interior Architecture program combined with product design; professional relevance; and modeling the future of interior architecture education in public education."

The graduate programs in APDesign also earned high marks in several design education focus areas. The graduate architecture program ranks No. 10 in engineering fundamentals. The landscape architecture program ranks in the top five in 10 of 11 landscape architecture design focus areas, including top rankings in two areas, project planning and management and engineering fundamentals and second, behind only Harvard University in interdisciplinary studies.

"Our consistent showing year after year in these national rankings are testament to the efforts, dedication and drive of our faculty, staff and students, as well as the perceived quality of our alumni in their practices," said Tim de Noble, dean of the college.

In addition, DesignIntelligence has selected one of the college's faculty members as among the most outstanding educators in the nation. Robert Condia, professor in the department of architecture, was named to DesignIntelligence's 25 Most Admired Educators for 2017-18. Condia is well known among his students as one who has a natural ability to easily impart his vast knowledge of architecture using innovative teaching methods. Condia joins de Noble, Stephanie Rolley, department head of landscape architecture/regional and community planning, and Howard Hahn, associate professor of landscape architecture, who were previously honored.

"These rankings come on the heels of APDesign re-inhabiting or new facility at Seaton and Regnier Halls, to be dedicated on October 13, 2017, and in [USA Today's recent article](#) showing architecture - and by extension, both landscape architecture and interior architecture - as having the highest job placement in the nation," de Noble said.



K-State researcher receives one of 30 new NSF EPSCoR fellowships

A Kansas State University researcher has been awarded an inaugural [National Science Foundation fellowship](#) to learn new microscopic methods to take 3-D movies of live cells as they move.

One of 30 researchers nationwide, Jocelyn McDonald, assistant professor in the Division of Biology, was [awarded](#) the new Research Infrastructure Improvement Track-4 fellowship through the National Science Foundation's Established Program to Stimulate Competitive Research (EPSCoR) initiative.

The fellowship provides opportunities for pre-tenure investigators to further develop their individual research potential by partnering with another researcher at a premier research center. McDonald will collaborate with Denise Montell at the University of California, Santa Barbara to learn how to use light sheet fluorescent microscopy, which can capture 3-D images of live cells as they move in tissues.

McDonald works with specific fruit fly cells that migrate as a group, or collective, which is broadly important for the embryonic development of many organs. According to McDonald, it is not well understood how these cells stay ordered and migrate inside dense tissue. Light sheet fluorescent microscopy could help scientists see that process in more detail and for a longer time than previous techniques.



With mock space capsule, researchers partner with NASA to study astronaut fitness

A mock space capsule has landed in Kansas State University's Ice Hall. In this built-to-scale model of the Orion spacecraft, "astronauts" practice emergency escape maneuvers while a university kinesiology team studies their health and fitness levels.

It's all part of NASA's plan for further human exploration of the solar system, from a Mars mission to a deep space mission.

The university research team - led by Carl Ade, assistant professor of exercise physiology, and Thomas Barstow, professor of exercise physiology - has partnered with the Johnson Space Center in Houston to tackle a major challenge for these long-duration space missions: the return to earth.

"Maintaining astronaut health is critical to NASA missions, and we need to be able to keep astronauts safe in flight and during landing," said Ade, who has previously studied [astronaut health](#). "By knowing fitness and health standards, we can determine types of in-flight interventions to keep astronauts healthy on long-duration missions that can last several years."

Ade and Barstow are using a two-year NASA grant to

"There are many techniques to look at cells in their native environment, but usually the light from the microscope is too intense," McDonald said. "This particular system, the light sheet microscope, has gentle light, it's three-dimensional and we can do really long-term imaging to view the cell group on its four- to six-hour journey in the tissue and make 3-D movies."

Another method that McDonald and an accompanying postdoctoral researcher, Yujun "Eugene" Chen, will learn as part of the fellowship is a technique using a confocal microscope's strong light that can turn proteins on and off in the cells to control cell movement.

Gov. Brownback signs proclamation marking 50th anniversary of Division of Biology

Kansas Governor Sam Brownback signed a proclamation on Sept. 22, 2017 to mark 50 years of groundbreaking accomplishments by Kansas State University's [Division of Biology](#).

"The proclamation is celebrating yesterday's success and the Division of Biology's promise for tomorrow's innovation," said Jim Guikema, associate director of the division and 50th anniversary coordinator.

Formed in 1967 by combining the disciplines of zoology, botany, bacteriology, biophysics and environmental sciences, the Division of Biology has obtained more than \$275 million in extramural support and formed one of the first long-term tallgrass prairie ecological research stations supported by the National Science Foundation in the nation, which became [Konza Prairie Biological Station](#).

The Division of Biology is committed to all aspects of human health and well-being. The division pioneered the university's Johnson Cancer Research Center and is home to many [interdisciplinary research initiatives](#), including the [Arthropod Genomics Center](#), [Bioinformatics Center](#), [Ecological Genomics Institute](#) and [The Institute of Grassland Studies](#).

study the strengths, cardiovascular health and aerobic capacity that astronauts need for an end-of-mission landing or an emergency escape.

"We want to determine if astronauts need to reserve a certain level of strength or cardiovascular capacity during flight so that they can land safely after a one- or two-year mission," Ade said. "The model capsule lets us test that in a way that is translatable and allows NASA to apply it directly to future missions."

Ade and the team are studying research participants as they perform the same tasks in the model capsule as astronauts would during an emergency escape. Participants wear special equipment that takes physiological measurements - such as muscle activity, oxygen uptake, heart rate and blood pressure - to determine what kind of stress the body experiences during an emergency escape.

The mock-up Orion capsule is constructed to the exact dimensions as the real version. The research team traveled to Johnson Space Center to make measurements, look at blueprints and develop a way to create the space capsule in Kansas. Local manufacturing companies helped with the design and frame. Once the capsule frame arrived at the Manhattan campus, the research team finished the construction.



DID YOU KNOW?

K-State's [College of Agriculture](#) was ranked 4th in a national survey of the Best Colleges of Agricultural Sciences in America by [Niche](#).

Kansas State University's College of Agriculture/ K-State Research and Extension are doing great things for our students, the citizens of Kansas, and the biggest industry in our state - agriculture. To learn more, view the fall 2017 issue of the [AgReport](#). We encourage you to submit [comments](#) on the current issue and ideas for future topics.



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