Senses and sense ability
How sensory analysis investigates what we see, taste, smell, feel, touch ... and buy

Air travel with dummies
Engineers use special mannequins to improve airplane safety, comfort

Detect and defeat
Researchers take aim at deadly swine diseases
Kansas State University’s TRIGA research reactor operating in steady state at 100 kW of thermal power.
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Seek is a publication of Kansas State University and is produced by the Division of Communications and Marketing.

Find Seek online at Kansas State University’s New Prairie Press, http://newprairiepress.org/

Knowledge. Discovery. Creativity. Answers. Solutions. These are what we seek at Kansas State University — and more.

There’s no such thing as a K-State magazine. Instead, we’re unleashing a series of thought-provoking publications highlighting the many facets of K-State and our quest to become a Top 50 public research university by 2025.

In the pages of Seek, we invite you to experience, or “See,” some of the best K-State has to offer.

And there is much to discover. As a university with the Carnegie Classification of highest research activity, K-State researchers are involved in wide-ranging work that addresses such key areas as bio-agro security and global food systems, better health and nutrition practices, advanced technologies and the natural world.

Our inaugural issue looks at why Kansas State University is a world leader in sensory analysis, where the human senses are used to develop products and make them better. Our internationally recognized Sensory Analysis Center conducts research and works with companies across the globe to feed hungry children, provide pets better food and even develop a better cup of coffee.

Worried about catching the flu when flying? Learn how FAA-supported K-State research uses a unique approach in air cabin research to keep passengers healthy and comfortable.

As the nation’s first operational land-grant university, Kansas State University has a long history of leadership in animal health. See how K-State swine research is successfully taking aim at deadly diseases, particularly the devastating porcine reproductive and respiratory syndrome, or PRRS. Our research has produced vaccines, diagnostics and more to help swine producers in the U.S. and worldwide.

Geomicrobiology is a relatively new field, but one in which Kansas State University geoscientists are making strides. These researchers are studying the role microorganisms play in driving the chemistry of geological environments, which could lead to safer drinking water and even new ways to extract energy from depleted oil reservoirs.

Seek is not the only addition to the K-State family. Our Salina campus has a new name to better reflect the hands-on, interdisciplinary and applied learning approach of its professional programs that prepare students for their chosen career field. Find out how Kansas State University Polytechnic Campus is positioned to meet industry needs in technology, aviation and more.

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Outbreaks of nasty diseases remind us of the importance of vaccines in protecting our health. Last year it was Ebola, and this year it’s Zika. In January 2016, Science magazine released a list of the top vaccines researchers need to develop. Kansas State University is working on two of them at its Biosecurity Research Institute, or BRI. Other pathogens being studied at the BRI are among those proposed for the National Bio and Agro-defense Facility, or NBAF, which is under construction near the institute.

“BRI is an important asset to K-State, and it became a reality with the groundbreaking in 2004. In the 12-year history of the BRI, we've brought some of the best people in the world who are thinking about these critical disease problems right here to Kansas because we — the state and federal government and K-State — have invested in the research infrastructure to be able to study highly impactful diseases in the safest laboratories in the world,” said Peter Dorhout, vice president for research.

Dorhout says some of the most virulent diseases, such as H1N1 and other flu viruses, develop because of human interaction with animals. “Even though we have best practices in the developed world for managing livestock, the kitchen garden farm is pervasive in the rest of the world. That is at the nexus of a lot of human-animal disease interactions,” Dorhout said.

K-State’s investment in faculty and staff equipped to address these problems attracts students who want to make the world a safer place. “From food supplies to drinking water to farming practices, they want to ensure that the Kansas and American food supply are the safest they can be,” Dorhout said. “We want it to be the envy of the world.”

Visualizing vaccines

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Research activity at highest level

According to the latest Carnegie Classifications for Institutions of Higher Education, Kansas State University classifies as a university with the “highest research activity.” The Carnegie Classifications in annual four-year, ten-year to recognize and describe institutional diversity in U.S. higher education. In its new classifications, announced in February 2016, one 2013-2014 data from the National Center for Education Statistics, the National Center for Science and Engineering Statistics, and The College Board.

“K-State has had a rich history of research coupled with our land-grant mission, and we’ve made a strategic effort to build our strengths in animal health and global food systems to enable impactful technologies, address emerging issues, and advance human and animal health,” said Peter Dorhout, vice president for research.

Research activity is a key piece of the university’s plan to be a Top 50 public research university by 2025, said Dorhout, who noted that K-State research expenditures grew 22 percent from 2009 to 2014.

A toxic shock: Discovering how genes help this fish thrive in troubled waters

Meet the Atlantic molly — an extremophile fish that lives and thrives in toxic water in Mexico that is full of hydrogen sulfide from natural oil deposits and volcanic activity.

How? It’s all in the genes. That’s according to Michael Tobler, K-State assistant professor of biology, who helped lead a 10-year collaborative project with a biologist at Washington State University to discover how the molly can survive in some of the toughest environments.

Using genomic tools, the researchers compared gene expression of the molly living in hydrogen sulfide environments with the molly living in nontoxic environments just a few yards away. They found that the fish have a two-pronged approach to survival: They become inert to the toxins that enter the body and they are able to detoxify hydrogen sulfide more efficiently.

“Learning how these extremophiles function tells us something very fundamental about life itself,” Tobler said. “It tells us about the boundaries where life can exist, which tells us something basic about how cells and organisms work.”

The research appears in Molecular Biology and Evolution.

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Teen speak on fleek and reason to freak? Not in the way you think, linguist says

How teenagers speak IRL — in real life — is not ruining the English language, according to Kansas State University linguistics research.

In fact, teenagers may not be causing language change the way that we typically think, said Mary Kohn, assistant professor of English. Kohn studies language variation and how language changes over time.

A publication of the American Dialect Society — found that teenagers are not solely causing language change. Rather, language changes occur throughout a lifetime and not just during the teenage years.

“Our research has shown teens are being dynamic with language, but not necessarily in a consistent way,” Kohn said. “We aren’t eliminating the possibility that teenagers are driving sound change, but we might be grossly overestimating the role of teenagers.”

Following the crowd

Your high school classmates bit you up to help fund their research, and you’re saving crowdfunding for disaster relief and medical costs — but for research?

“Rather, language changes occur throughout a lifetime and not just during the teenage years,” Kohn said. “Our research has shown teens are being dynamic with language, but not necessarily in a consistent way.”

Amber Vennum, assistant professor of marriage and family therapy, became the first at K-State to attempt to gain crowdfunding for research. She raised $5,625 to support her applied project, “Working on What Works,” a classroom intervention technique that uses positive reinforcement.

Vennum selected Experiment.com, a platform that helps researchers raise funds to conduct studies in fields from social science to chemistry. Experiments have 30 days to raise the necessary cash, and backers can access lab notes to see how the work proceeds.

Venum likes the idea of connecting with her funders. “For the applied project I do — and this one in particular is local — crowdfunding is giving the community the chance to be involved in the research,” Vennum said. “On the site I used, anyone who donates or supports the project gets updates on how it’s going and an inside look at the research process and outcomes. With the school districts I work with, making that connection is important.”

New CAREER award winner

Pavithra Prabhakar, assistant professor of computing and information sciences, has received a five-year, $446,000 CAREER award from the National Science Foundation for her project “Robust Verification of Cyber-Physical Systems.”

“Cyber-physical systems are an important part of modern society and they have transformative applications in transportation, health care and energy sectors,” Prabhakar said. “This research will bridge an important gap in the existing methodologies for the analysis of cyber-physical systems, and will enable the development of high-confidence cyber-physical systems, particularly automotive and aerospace systems.”

The NSF’s Faculty Early Career Development Program is one of the foundation’s most prestigious awards for supporting early career faculty who effectively integrate research and education in the context of their institution’s mission.

In December 2015, the Office of the Vice President for Research offered a Water Seed Grant Program to fund one research award and three grants to develop teams to address water research needs from many angles. The $89,710 research award will help a team from the geology department develop a critical zone observatory for water research in Kansas. Team development awards will explore a grant that requires less water than other crops, systems to manage water across the catchment-intervention, and decoupling fertilizer production from fossil fuels.

A mobile approach for better animal health

Veterinarians across the country can now get results sooner from the Kansas State Veterinary Diagnostic Laboratory thanks to the lab’s new app for mobile devices.

Gary Anderson, director of the lab at the university’s College of Veterinary Medicine, said the new app is a time-saver.

“This is a major advancement in being able to provide diagnostics to practicing veterinarians out in the field,” Anderson said. “Traditionally, we have used a variety of methods of delivery, from snail mail, telephone, fax and email. This app will give veterinarians a way to track the results as soon as they are received here in the lab. It will save time for everyone involved and is a real win-win for veterinarians and their clients who are seeking the best in medical care for their animals.”

The app is available on the App Store and on Google Play; just search for “KVVD Mobile.” Clients can get more information about the app by contacting the Kansas State Veterinary Diagnostic Laboratory at clientcare@vet.k-state.edu, 866-512-5650 or visit ksvdl.org.
Senses and sense ability
The SENSATION BEGINS WITH A BLANK CANVAS:

By Jennifer Tidball

K-State’s internationally recognized Sensory Analysis Center

A white room. White fluorescent lights. People in white lab coats.

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sense ability

Senses and

Sensory analysis evaluates products from a sensory perspective. It measures consumer reaction through the five senses: sight, smell, taste, touch, and hearing.

Current research:

- Textiles
- Essential oils
- Shoes
- Meat
- Nail polish
- Pomegranate juice
- Cheese
- Bread
- Chocolate
- Fresh fruits and vegetables
- Beverages
- Shampoo
- iPad usage research
- Methodology research

One of the center’s biggest projects tackles two of a coffee grower’s biggest challenges: cultural resistance and climate change, which is causing rising temperatures that make it difficult to grow coffee.

Researchers want to find varieties of coffee that taste good but are less susceptible to rust diseases and birds. They are testing different cold temperatures. The center is working with coffee exporters to purchase 600 coffee varieties and find 100 varieties that contain flavors and characteristics that people like and will buy.

Once researchers find the top flavors, they will work with coffee roasters to make coffee variants. A $310,000 World Coffee Project grant is supporting the project, which also involves Texas A&M University and World Food Prize laureate Professor Edgar Chambers IV of Kansas State University’s Sensory Analysis Center.

Professor Delores Chambers and University Distinguished Professor Edgar Chambers IV of Kansas State University’s Sensory Analysis Center.

K-State’s internationally recognized Sensory Analysis Center uses five senses to analyze and improve products.

By Jennifer Tidball

THE SENSATION BEGINS WITH A BLANK CANVAS: white walls. When fluorescent lights have been turned out, lab coats. White and clear utensils on a white circular table.

It is around this white circular table that the research magic happens. Coffee becomes “oily,” “porous” or “fibrous.” Pet food looks “oily,” “porous” or “fibrous.”

Pet food looks “oily,” “porous” or “fibrous.” Essential oils smell “minty,” “floral” and “grassy.”

The research magic has a more accurate name: sensory analysis. Sensory analysis means how people react to products and items through the five senses: sight, smell, taste, touch and hearing.

Through sensory analysis, Kansas State University researchers are trying to answer questions such as: Will children use a high-protein porridge made of sorghum? Will consumers consider dye color or ingredients when they buy clothing? Do consumers consider dairy products and items through the five senses: sight, smell, taste, touch and hearing.

Food safety

What do people want in artisan textiles? Natural dyes? Perfect patterns? Cotton researchers are finding out by studying shades and clothing from Turkey, Peru, India and across the world.

Researchers have discovered that consumers want high-quality artisan textiles, but they also want a few minor imperfections — such as a small crooked pattern or a slightly uneven edge — because it shows the handmade characteristics of the textile. Consumers also are working with artisans to describe irregularly colored products, such as different shades of blue or purple, and to determine what is a slight shade of a silk shade. The online research can help the textile artisans make a living from their homes, even if they live in a remote village in the countryside. The research also is important for maintaining rural populations and cultures.

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Kansas State University eschew at the research, too. The Journal of Sensory Studies recently named the Sensory Analysis Center the top in the world for sensory analysis research influence.

Even more, the journal ranked three university researchers among “301 individuals worldwide for sensory research influence: Edgar Chambers IV, director of the center and university distinguished professor of food, nutrition, dietetics and health, ranked No. 1; Delores Chambers, co-director of the center, ranked No. 5; and Kade Koppel, assistant professor of food, nutrition, dietetics and health, ranked No. 40. The rankings were based on a combination of research articles published and number of citations from 2009 to 2015.

“The ranking and recognition tell us that the work we do is useful to people,” Edgar Chambers said. “Our research is used by people every day, which is what we do is useful to people.”

Common senses

THE SENSORY ANALYSIS CENTER CONDUCTS more than 50 studies every year. Some studies are industry-sponsored work, while other research studies focus on the products that people use every day: coffee, shampoo, soda, cheese, stinky sandwich, meats, and pit food. The center, part of the College of Human Ecology, started at the university’s Manhattan campus in 1983 and moved to Kansas State University in 1998.

A second location opened at the university’s Olathe campus in 2011. Olathe is equipped to handle two areas of research: descriptive sensory and product evaluation. Additionally, the center also brings in consumers to evaluate products.

“The center serves as a facility where companies can ask for a project to be done,” Koppel said. “We can analyze their product, determine their position in the marketplace and compare their product to competitors. Sensory analysis can explain why some products are liked or not liked and what makes a product successful in the marketplace.”

Where’s the Olathe location fits in. While the Manhattan location performs a mix of research projects and industry projects, the Olathe location in the Kansas City metro area primarily conducts consumer testing funded by industry.

“We are still K-State, but we are K-State with an industry hook,” said Marianne Swaney-Stueve, project manager for the Olathe location. “When you partner the center’s industrial work with its descriptive analysis work, it makes the best test so that they can use the results to improve their products.”

“Making cents of sense ENTRE INDUSTRY SENSES MAKE CENTS for the university and economy, and industrial partnerships are another way the Sensory Analysis Center aims to change the world around us. The center tries to maintain a healthy balance between research projects and industrial client projects.”

“We connect the two sides of research,” Koppel said. “We want to figure out the compounds that are causing some of those aromatic sensations that we perceive as human beings. It is often a matter of using both data sets and understanding one through another.”

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For students such as Kelly, these extensive experiences reach across the globe. Delores and Edgar Chambers have led several graduate student research study tours to various countries, including a 10-student trip to Turkey in October 2015 and an eight-student trip to Egypt in January 2016.

In Turkey, students researched eating habits and learned how to translate and conduct research in different languages, Delores Chambers said. The group even appeared on a Turkish cooking show, “Cooking with Oktay Usta.”

“The trip really allowed students to visit with families to learn about how they eat, what their homes look like and what their lives are like,” said Delores Chambers, who also has taught classes in Thailand. “It is important for our students to have these cultural learning experiences and interactions.”

Such international experiences may be far away geographically from the white research rooms of Ice Hall, but the Sensory Analysis Center makes the world seem smaller through its partnerships and research on products that are used around the world every day.

“Our research is diverse, but it affects each of our lives,” Edgar Chambers said. “We want to change the world one person at a time.”
How a team of engineers and mannequins is improving comfort and safety for passengers in airplanes

“This is it,” says Byron Jones, professor of mechanical engineering, as he flies several switches. The large, darkened air cabin springs to life with warm electronic hums and the sound of air circulating overhead. Stubby nozzles, which passenger seats began functionally blowing air downward. Portable lighting rigs illuminate the cabin and its silent, lifeless passengers.

This is a scale-model Boeing 767 passenger cabin. Kansas State University researchers use it as a laboratory to conduct ground-based air cabin research for the Federal Aviation Administration and the commercial air transportation industry.

By Greg Tammen

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By Greg Tammen
Engine safety

Mahan Naryei Amiri, instructor of civil engineering, works with a jet turbine engine in one of the small labs. He is looking at whether chemicals and toxic particles in the plane’s fuel and oil can be released into the passenger cabin if one of the engines has a leak.

“There are several case studies in which passengers sued an airline because they reported smelling oil during the flight and then after the flight the oil leaked and had memory loss,” Naryei Amiri said. “These passengers reported that they could smell oil at some point during the flight. It’s something that’s hard to prove because you can’t see it, we want to figure out if it actually happened.”

Airplanes do not have an air-conditioning system. The turbine engines that propel the plane also compress fresh air from outside the craft into the passenger cabin to cool it. If oil or jet fuel leaks into the engine as it’s compressing air, chemicals and particles from those fluids can be released inside the passenger cabin, Naryei Amiri said.

To study the particles, Naryei Amiri relies on a turbine engine and an air simulation system that generates different concentrations through temperatures and pressure adjustments. Oil and fuel are then injected into the engine, and Naryei Amiri looks at what particles are coming out and what happens during compression.

While he cannot speak to the medical effects, Naryei Amiri and colleagues have published multiple studies on their findings about various particles and chemicals that are released.

“If an engine is healthy, this kind of thing will not happen,” Naryei Amiri said. “But if there is something wrong with an engine, a small amount of oil or fuel leak during a flight could cause a problem.”

The FAA is working to develop sensor technology that can detect the source of a leak and automatically air compression off for the affected engine.
Kansas State University geoscientists explore interrelated processes to protect resources and human health

Humans have not had a long time, geologically speaking, to advance understanding of the earth and its processes. We’ve had even less time to connect knowledge in different disciplines.

Geoscientists researchers at Kansas State University are making those connections in everything from the formation of volcanoes and mineral resources to finding the “control knobs” for natural processes that cause sediments to release metals in water. Their work ultimately helps protect precious resources to boost food, energy and water security as well as human health.

The lost arc

If you were a kid who hoarded rocks and minerals, you can probably relate to Matt Brueseke’s specialty in petrology, or how rocks form. Brueseke’s particular interest is in igneous petrology, or rocks that solidify from lava or magma. Samples of rocks that came from magma can shed light on the relationships between volcanoes and the movement of large sections of the earth’s crust over the underlying mantle, also known as plate tectonics. Studying material volcanoes churned out in the past helps us understand hazards like Yellowstone and other volcanically and seismically active areas. The best place to do this is where there’s a plate boundary.

Alaska fills the bill, specifically, Wrangell St. Elias National Park and Preserve’s 13.2 million acres encompass a huge, complex arc of volcanoes. “We hardly know anything about them,” said Brueseke, an associate professor of geology at K-State. “We’re calling it the lost arc.”

One reason we don’t know much about the area is that it’s not an easy place to take samples. Everything is remote; so much so that Brueseke and other members of his National Science Foundation-funded team have to travel in Piper Super Cubs. The light planes can land in 30 feet when necessary, which is handy in a place where paved runways are out of the question. The planes each carry supplies for one or two people for five days in bear containers and buckets with lids. Weight limits are strict.

Conditions and logistics are challenging. Researchers hike up surrounding cliffs and through muskeg, the local term for bogland — sometimes for many miles — and collect lava samples. Samples are required because terrain can be steep and researchers must guard against falling rock. Alaskan summers are damp, with temperatures in the 60s to 70s in the daytime and the 40s at night. As researchers empty their bear containers of food, they fill them with rocks. The next site’s supplies are already packed and ready, so when the team has collected enough samples at one site, the plane comes and takes everyone to another spot, a process that requires four or five flights. If the wind is blowing or the cloud base is too low, the Super Cubs can’t fly, so schedules and supplies may have to stretch and team members can be stuck in their tents.

Brueseke said the fieldwork is more intense than he’s ever done, but the fist-sized samples he and his team haul out of the park yield a wealth of information with global implications. Back at home, the researchers look at thin slices of the rocks under a microscope and pulverize some into a powder to send to labs that determine element and isotope concentrations that indicate what melted to form the rock. Radiometric dating helps researchers piece together a history of the mysterious volcanic field: frequency and types of eruptions, relative ages of different volcanoes, and the relationship between volcano formation and plate movements. All of this helps advance understanding of how the volcanoes developed, when eruptions occurred and how dangerous those eruptions were. Many trans-Pacific flights go near and over the Wrangell Mountains, and
Another major project of Brueske’s is applying this research to the process of gold and silver mineralization.

“Do you apply the same techniques that determine the role of microbes there to determine the role microbial processes play in the processes of gold and silver mineralization? For example, how do the magmas induce the mineralization? That’s the question that’s facing geologists in the world. It’s one of the most pressing issues for many years,” Datta said.

To help solve pressing problems, Datta said, “I work with the latest synchrotron radiation techniques and mass spectrometry to understand the role of microbial populations in了解 the mineralization process.”

“Protection of resources with microbial ‘control knobs’”

Kirk, Saugata Datta, associate professor of geology, and Matthew Kirk, assistant professor of geology, use microbes to understand and control environmental processes. Saugata Datta, associate professor of geology, looks at sedimentary environments and the impacts of marine biological processes on the problem of how to control and manage the mineralization of heavy metals.

Kirk, Saugata Datta, and Matthew Kirk are working on new techniques to control the mineralization process through the use of microbial populations. Kirk’s research is focused on how microbial populations can control and manage the mineralization process through the use of microbial populations.

“Understanding environmental controls on microbial populations helps us understand how microbial reactions are controlled and how they affect water quality,” Kirk said. “We can use the ‘control knobs’ on microbial populations to adjust quality in both natural and engineered systems.”

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Kansas State University researchers take aim at deadly swine diseases

Late in 2015, scientists at Kansas State University and the University of Missouri delivered news that likely had swine producers worldwide rejoicing: The researchers had developed pigs that are resistant to porcine reproductive and respiratory syndrome, the most devastating disease in the industry.

Known as PRRS, the disease has wreaked havoc on swine operations to the tune of $10 billion over the last 20 years. It is estimated that the disease robs the swine industry of $600 million each year.

So pardon Raymond “Bob” Rowland if the universities’ discovery seemed surreal. The professor of diagnostic medicine and pathobiology at Kansas State University has studied this disease for more than 20 years, nearly his entire professional career.

“I always thought that it would be a generational problem,” Rowland said. “That is, it wouldn’t be solved by me, but probably by the next generation of scientists.”

Resistant pigs are ‘game changer’

It took Randall Prather, a professor of animal science at the University of Missouri, 10 years to genetically engineer pigs so that they would lack a critical protein that seemed to make the pigs susceptible to PRRS. Staff at Kansas State University’s Large Animal Research Center challenged the pigs in a research setting with the PRRS virus.

“Our first experiment was with the CD 169 protein, but it turned out that was not the molecule,” Rowland said. “We moved on to CD 163 and we found almost immediately that it not only was the right range, it was black and white. When we saw the data, it was very clear that we had the desired result.”

The scientists may be able to apply the same concepts to other diseases, Rowland said. At Kansas State University’s Bioscience Research Institute and the Department of Homeland Security’s National Bio and Agro-defense facility, which is under construction adjacent to campus, Rowland sees numerous opportunities to continue research that benefits animal well-being, supports industry and helps meet the global demand for animal protein.

“It’s a unique way of tackling viral disease. It is truly a game changer.”

University relentless in solving PRRS

It shouldn’t come as much of a surprise that Kansas State University researchers were part of the breakthrough on PRRS. In terms of a commitment to research of that disease, “we own PRRS,” said Rowland. “There are a lot of groups in the U.S. doing research in this area, but for...
The industry is booming, with an estimated 6 million head and $8 billion in sales. In a state known for beef, pig research is also thriving. In 2008, the U.S. Department of Agriculture selected Rowland as project leader of the multistate PRRS coordinated agricultural project. The project was funded for $4.8 million, and set the stage for some of the early breakthroughs in the field," Bai said, noting that the information his team is able to provide also helps scientists with their research.

In another project, Kansas State University researchers have developed a method to identify and characterize porcine parainfluenza type 3 virus (PPV-3) in pigs. This work will help lead to the development of vaccines against the PRRS virus. She is also working to develop vaccines against other high-risk viruses, such as swine influenza, African swine fever and Senecavirus A.

In early 2016, Hause’s lab also reported the first formal identification and characterization of porcine parainfluenza virus type 3 from U.S. pigs, which had previously only been detected in Asia. This work will help lead to vaccines.

Rowland said that beyond such major projects as discovering new techniques to help swine farmers, Kansas State University is supporting swine research that is for the common good. “As researchers, we are free to pursue the problems that we want to pursue, the problems that will do the most good,” he said. “It’s not just studying a virus, it’s a philosophy.

Research benefits people, animals and the environment. For instance, Jianfa Bai, an associate professor in the Kansas State University’s Department of Animal Sciences and Industry, is working to develop vaccines for PRRS, which is a viral disease that causes respiratory and immune system problems in pigs. The disease is estimated to cost the U.S. swine industry $1 billion per year.

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The name of Kansas State University’s campus in Salina has, for 10 years, signified change, since its establishment in 1904, the property has been given four different titles, and just last year, changed again. But what are some real identity shifts apart from the other in a university — there is more, a lot more, than what meets the eye.

Kansas State University Salina is now known as Kansas State University Polytechnic Campus — an idea that came about two years ago when university officials were planning for the future. Several committees were formed to discuss, research and develop concepts that could enhance the campus’ name and somewhat enclose educational style in a way to give it a much-needed niche and help with national growth.

When examining what the campus is and its core and the type of learning environment provided to students, what seems undeniable is that the word “polytechnic” encompasses the campus mission. A polytechnic education is synonymous with hands-on, interdisciplinary and applied learning, focusing on professional programs that prepare students to move directly into their chosen career field. From the beginning days of Salina Technical Institute, through Kansas Technical Institute, Kansas College of Technology, K-State Salina and now, the campus on Centennial Road has always offered that kind of immersive experience and it’s precisely the discussion in which current Dean and CEO Vera Fitzsimmons wants to keep moving.

“Since its inception, 30 years ago, the campus has continuously provided an educational climate that integrates theory with experience through project-based work, research opportunities and connections to industry,” Fitzsimmons said. “We are ready to take that tradition into the next 30 years, and identifying ourselves as a polytechnic campus perfectly represents who we are and the experience our future students will have here.”

During the investigatory phase of how to best position the Salina campus for success, the committee examined a variety of models, the high school population within the Salina, how to increase student enrollment and the state of Kansas; magnet schools across the country that are hubs for aviation and engineering technology, and the distinctiveness or uniqueness of its programs against other universities. That information confirmed an imminent need to rebrand students on a national level, which involved creating a way to market the campus just for its location but for its signature education.

“The Salina community has always been an ally in support to our cause and we are thankful for how the city has invested in the growth and change of the campus,” Fitzsimmons said. “We are in a transition, though, where we have to demonstrate our uniqueness within the K-State system as well as what makes us different from other institutions with similar programs of study. In order to be competitive, we must show how our students learn, not where they learn.”

The idea of changing the campus name to demonstrate a polytechnic identity was then presented to faculty and staff at large, advisory board members and campus industry partners. The transformation was guided with students and alumni, and even instructors and admissions representatives at state community colleges added to weigh in. When explained the reasoning behind the proposed change, it was evident that becoming “polytechnic” is a step in the right direction.

The decision to transform from K-State Salina to Kansas State Polytechnic was first approved at a Kansas Board of Regents meeting in September 2015 by the Council of Chief Academic Officers. A month later, the proposal went before the Council of Presidents and the Kansas Board of Regents where it passed and went into effect immediately.

Polytechnic in motion

From curriculum overhauls to newly acquired research facilities and special opportunities with industry partners, Kansas State Polytechnic is working to give its students an even better education and fully engaged education. The new campus name, “The experience matters,” reflects how the polytechnic way of learning is not only innovative and cutting-edge teaching and learning to today’s classroom.

In the emerging technology department, computer systems technology faculty members have completely revamped their program; what students study and when, and how they work with and another and outside companies. The curriculum change pays more responsibility to the students — still providing them with the needed foundation in technology, but also giving students an expanded opportunity to apply what they’ve learned to present trends.

“Things are always evolving in this industry, and while it’s virtually impossible to anticipate, we can usually adapt to those changes because our recognized curriculum structure is set up in a way to make students prepared and relevant,” said Troy Harding, computer systems technology professor.

Learning in fall 2016, students are required to enroll each semester in studio classes where they will work in...
Anyone can purchase an unmanned aircraft and fly it, but that's not what industry needs," said Andi Meyer, USI research program manager and senior research engineer. "Our students need how to fly safely and collect quality data that others need for a variety of applications. That means choosing the right aircraft with the right camera and sensor, configuring it to the right altitude and speed and then taking the gathered data and putting it into a model that provides the right information."

The idea of a hands-on education isn't lost on Trenton Witt, a junior in USI. As a student employee in the USI lab, Witt has worked side by side with faculty and staff acquiring various approvals and exemptions from the FAA for the program as well as processing and analyzing data from research projects. "Being involved on campus even encouraged me to start his own business, offering low altitude aerial photography and aerial data plotting."

"My favorite part of the Polytechnic education is connecting the data — when you go from an idea or a theory to seeing it in motion, actually working," Witt said. "Employees are looking for experience, and this counts."
The Art of Curating

Elizabeth Seaton, curator at the Marianna Kistler Beach Museum of Art, brings a variety of art to the K-State campus

By Taylor Manges

Seaton said technology has changed the way she and other art historians research for exhibits, especially for large exhibits like “Art for Every Home.”

“With the Internet, we can take one back in time. It’s a great depression through the art. They get very nostalgic,” said Elizabeth Seaton, lead curator of the exhibits.

The American Associated Artists, or AAA, established in New York in 1934, sought to bring art over the threshold of an economically and regionally diverse group of Americans, according to Seaton. The business published prints by regional artists Thomas Hart Benton, John Steuart Curry and Grant Wood that were sold by mail-order catalog. AAA artists also made ceramics, textile designs and paintings for corporate advertising.

For seven years, Seaton worked with a team of scholars across the country to research AAA and choose works for display in the exhibit. Prints from Kansas State University’s art collection join the display in the exhibit. Seaton, from Winfield, Kansas, received her undergraduate degree from Harvard University and a doctorate in American art from Northwestern University. She returned to Kansas and joined the Beach Museum of Art in 2003, becoming curator in 2013.

“I was so happy to bring my training back to Kan- sas, to study the work in my own backyard,” Seaton said.


“Half of Shakespeare’s plays would have been lost except for the printing of this book,” an origional copy of which sold recently for $6 million,” Hedrick said. “But more importantly, it was voted by publishers as one of the five most important printed books in world history.”

The nearly 400-year-old book’s visit was part of “Shakespeare in the Little Apple,” a monthlong celebration of Shakespeare-related events in Manhattan, Kansas. Hedrick said experiencing the book with his students, colleagues and Masterclasses alike was a joy from the “afterlife” of Shakespeare. The celebration honored Shakespeare’s work throughout the year through performances, readings, musical adaptations, children’s activities and more.

“Shakespeare in the Little Apple” was the most extensive, wide-ranging and popular humanities event across campus and the community in decades that led to myriad attendance at the Beach Museum of Art, where the First Folio was displayed.”

Hedrick has held visiting professorships at noted institutions across the country — Cornell University, Amherst College, Colgate University and the University of California, Irvine — and was a Fulbright Scholar at Charles University in Prague — but said his heart is in his home state of Kansas with his students at Kansas State University.

His publications widely in top medical fields of Shakespeare, cultural theory and art, and his latest achievement includes directing Shakespeare’s “The Winter’s Tale” for the Manhattan Arts Center.

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Patrick, ceramics and textiles in the Marianna Kistler Beach Museum of Art’s “Art for Every Home: Associated American Artists” exhibit in Kansas State University’s art collection can take one back in time.

“The exhibition spans much of the 20th century, and people want to enter the 50s, the era of the Great Depression through the art. They get very nostalgic,” said Elizabeth Seaton, lead curator of the exhibits.

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K-State students initiate study of how TAOS PUEBLO NATIVE AMERICANS ARE SAVING AN ANCIENT CULTURE

Young Taos Pueblo partygoers cheered as water flowed through an aquacan, a 500-year-old irrigation system, to a field planted with heritage seeds.

Among guests at the irrigation party — where people work to clean out the irrigation ditches and enjoy food, music and companionship — were two Kansas State University anthropology students, Jordan Thomas and Kenzie Wade. The students, both seniors and involved in undergraduate research at Kansas State University, are interested in how the Taos Pueblo Native Americans in New Mexico are able to attract youth to traditional agriculture and save an ancient culture.

“This is the perfect place to do fieldwork on the sustainability and importance of native preservation,” Wade said, “because this group is taking charge of its sovereignty and growing something amazing with the youth.”

The majority of the partygoers in their early 20s already own farmland — a vast difference from the lifestyle Thomas and Wade have experienced. The fields were planted with Taos heritage seeds: varieties of corn, beans or squash not found anywhere else and passed down for generations. The fields were planted with Taos heritage seeds: varieties of corn, beans or squash not found anywhere else and passed down for generations.

For more than 1,000 years, the Taos people have inhabited the Pueblo, a multilevel adobe structure and a cultural site on UNESCO’s World Heritage list. Many of their deeply rooted cultural practices involve traditional agriculture and save an ancient culture.

The Taos Pueblo have been farming the land for more than a thousand years, which has shaped their culture, religion and language,” Thomas said. “When colonization happened and money came in, things started to change. For two generations, it became backward to grow your own food or speak your own language, and they saw a lot of people leaving the community or abandoning the culture.”

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The community has solar-heated greenhouses; an FDA-approved kitchen so growers can turn their produce into value-added products, such as salsa or jam; and a farmer’s market.

“The Taos Pueblo Young Growers to engage the next generation in ancient agriculture practices and reconnect them to their ancestors.”

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“They want nothing more than to make friends with strangers.”

With assistance from the Taos County Economic Development Corporation and Red Willow Cooperative, the youth are learning to preserve and strengthen the culture while making their traditions cost-effective.

Oppression and cultural abandonment drove younger generations away, according to Wade. Without the next generation, some feared the ancient culture, which had survived colonization, oppression and introduction of disease, might be lost.

“Multiple organizations tried to help the community get on its feet and be sustainable, but it wasn’t working,” Wade said. “The organizations would lose interest or the funding would run dry because they didn’t take into account what people wanted.”

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“Some people have taken their products to the regional scale,” Thomas said. “They can keep the same agricultural traditions while still having the channel to the economy.”

Thomas and Wade are working on a short documentary, “Cultivating Culture,” that is a cursory view of the oppression, traditions and culture of the Taos Pueblo people and how the community has been able to sustain itself in recent years.

“I feel like I’m on to something that really hasn’t been explored much in academia — how agriculture can connect to indigenous language and culture maintenance,” Thomas said.

The trip to Taos was funded through a few scholarships provided by K-State's anthropology program and an internship with the Taos County Economic Development Corporation. To save money the two students camped in a national forest outside the Taos Pueblo reserve and used a weed sprayer as a makeshift shower.

“Jordon and Kenzie have a deep faith in humanity that is present in their every move,” said Michael Wesch, K-State associate professor of anthropology.

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Today’s Taos Pueblo youth understand the community’s heritage. They started the Taos Pueblo Young Growers to engage the next generation in ancient agriculture practices and reconnect them to their ancestors.

They accept others as they are so everywhere they go they make friends with strangers.”

Thomas and Wade will use their work in Taos as a starting point for further investigation of the benefits of food systems and are writing a research article to the documentary as a more in-depth account of Taos Pueblo community.
University distinguished professor James Edgar is no stranger to surprising innovations.

In 2015, he received a patent for a process to improve semiconductors, materials that are crucial to all devices that are computerized or use radio waves—think cellphones and satellite television boxes—for removing defects that can degrade efficiency. Another of his projects is generating ultraviolet-light-emitting diodes, or UV LEDs, that can purify water or sanitize instruments with bacteria-destroying UV light. The National Science Foundation has supported his research for almost 25 years, and his work has brought him many publications and international recognition.

But what’s most surprising about Edgar, professor and head of Kansas State University’s chemical engineering department, is his ability to help others think through problems. Former student Jason Shanklin said this way: “I owe him a lot—a wonderful mentor. Jim cares and sees the potential in everyone.”

Peng Li, another of Edgar’s former students, said Edgar changed his life and made him who he is now. Shanklin and Li are founders of Nitride Solutions, a Wichita company that makes aluminum nitride, a high-value material with applications in power electronics, acoustic electronics and UV LEDs. The company has 10 employees and boasts customers in Asia and the U.S.

Li and Shanklin both worked in Edgar’s lab for several years in the early 2000s. Li obtained a doctorate in chemical engineering, and Shanklin graduated from Kansas State. Cisco and Oklahoma State University. “I have been directly involved in the semiconductor industry my entire life. The applied science training has given me the opportunity to be trained as a science researcher and manufacturer of some of the best in the business,” Shanklin said.

The doctoral scholarship program complements the university’s Time K. Dorothy Graduate Scholarship Program, which provides scholarships of $3,000 to master’s students and $5,000 to doctoral students.

Matthew Harde, doctoral student in biology, attended a biology undergraduates research experience at Kansas State University the summer before applying to graduate school. He won him on the university, getting the scholar-

New scholarship program provides competitive advantage

Enhancing the graduate scholarship experience is a key goal of Kansas State University’s plan to become a Top 50 public research university by 2025. One way the university is working to meet this goal is by becoming more competitive when it comes to attracting highly talented, diverse graduate students.

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Seek Spring 2016

How scientists sniff out what’s in a smell

Kadri Koppel, assistant professor of food, nutrition, dietetics and health, explains, in under 100 words, what a gas chromatograph is and how researchers at Kansas State University’s Sensory Analysis Center use this key piece of equipment.

“In food and other product analysis, understanding the composition of aroma is often important. A gas chromatograph is an analytic instrument that enables measurement of aromatic volatile compounds. In order to measure what the aroma consists of, we need to capture the aroma compounds and inject those in the gas chromatograph’s column. The compounds are separated out with a carrier gas pushed through the column. A detector in the end of the column helps us identify the aromatic compounds, thus helping us understand what causes our sample to smell the way it does.”

Researchers develop a first-of-its-kind laser

Consider this now patented discovery in the field of physics an illuminating one.

In 2011, Kristan Corwin and Brian Washburn, associate professors of physics, along with Andrew Jones and Rajesh Kadel, both Kansas State University physics graduates now working as industry research scientists, began developing a new kind of laser — one that is fiber-based and uses various molecular gases to produce light at difficult-to-reach wavelengths.

"Because it's a fiber laser technology, it may ultimately prove to be very portable," Corwin said. "Also, because it's based on a gas-lasing medium, it's inexpensive to produce."

Kansas State University researchers in collaboration with the University of New Mexico designed the laser technology from a hollow-core photonic crystal fiber that is about half the width of a human hair. This optical fiber is filled with a molecular gas, such as hydrogen cyanide or acetylene. The gas is excited with another laser, causing a molecule of the excited gas to spontaneously emit light. Other molecules in the gas quickly follow suit, resulting in light.

"The technology that led to this is remarkable," Corwin said. "The complex structures in the micro-structured optical fiber we use are micron-sized and uniform down many meters of fiber. By using the hollow fiber, we can have very high intensities of light even with relatively low powers. This reduces the lasing threshold with respect to free-space traditional systems and makes more portable applications accessible."

This lack of traditional systems makes the lasers a viable candidate for new communications and sensing technologies, Corwin said. Possible uses include transmitting information or high optical power through the Earth’s atmosphere as well as sensing harmful agents in the atmosphere. The laser received U.S. patent No. 9,106,055 in August 2015.

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Since its patent, recent breakthroughs in fiber design and fabrication by collaborators in Limoges, France, have made the lasers more efficient in emitting light.

Patented laser technology by Kansas State University researchers could be used to transmit information or high optical power through the Earth's atmosphere or to sense harmful agents in the atmosphere.

Chromatograph

Chro-mato-graph /kroˈmə-tə-graf, kro-A/

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Hog heaven

When it comes to swine research, Kansas State University is a national leader. It’s a reputation cemented by decades of work, evidenced in this photo taken in 1934 at the university’s ag experiment station. Described as “three pigs looking over fence,” the photo came about through a request by Cliff Aubel, associate professor of animal husbandry and swine investigations officer at the ag experiment station.

Aubel taught Elements in Animal Husbandry, Swine Production and Animal Breeding. Read more about K-State’s many contributions to swine research on Page 24.

Photo courtesy of the Kansas State University archives

Richard Potter, Kansas State University’s director of corporate engagement, is kicking the university’s collaborative potential into high gear with faculty boot camps. Potter helped to develop a series of “Working with Industry Boot Camps” in 2015 as part of a collaborative project with the Kansas State University Foundation, the university’s Institute for Commercialization and the Office of the Vice President for Research. The workshops, available via video archive on the Office of Corporate Engagement website, provide faculty and staff with tools to establish mutually beneficial industrial collaborations and develop strong strategic partnerships.

“We can play with industry but we need to do it in the right way,” Potter said. “In other words, there are ample opportunities to work together with industry that are in sync with our mission as a land-grant institution.”

The workshops cover many topics, including why corporate engagement is important, where to find valuable resources, how to initiate and formalize relationships, how faculty can promote themselves and their research, how to manage expectations, how to disclose and protect intellectual property, and tips and tools for meeting contractual obligations.

The university has many areas of expertise that corporations would find very useful, Potter said. The workshops were designed to encourage faculty to consider the potential of future corporate partnerships and build on existing partnerships.

“We bring to the table something that is of great value to industry,” Potter said, “including specific strengths related to well-being, human and animal health and nutrition, sensory analysis and grain science — all in tandem with global food systems.”

K-State is the only university with a grain science and industry department and, according to Potter, that means significant corporate interest and opportunities are available.

The university established the Bulk Solids Innovation Center at the Kansas State Polytechnic Campus in 2015, which is the first center in the nation to study the science of handling bulk solids, such as grains, sugar or minerals. For industries using bulk solids, the center can provide a wealth of knowledge, he said.

The university also is the western anchor of the Kansas City Animal Health Corridor, a concentration of more than 300 animal health companies. According to Potter, the corridor provides numerous opportunities for finding corporate engagement partnerships, such as the PetFood Innovation Workshop. K-State faculty work with industry professionals in conjunction with the annual Petfood Forum in April at the K-State Olathe campus to experiment with different techniques in making pet foods.

By Stephanie Jacques

See Corporate Engagement

Seek, Vol. 6, Iss. 1 [2016], Art. 17

See Corporate Engagement

These boots were made for engagement

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Photo courtesy of the Kansas State University archives
Electrified art

“Devotee” is one of the prints created by Kansas State University’s Jason Scullia, associate professor of art, using a contemporary printmaking method called electrolytic etching. The nontoxic method uses electricity and a saltwater solution rather than harmful chemicals to burn the negative image of a print into copper plates, which are used to transfer ink to the paper. In spring 2016, Scullia will show his electrolytic-created prints in a solo exhibition in Venice, Italy. It will be Venice’s first exhibition comprised entirely of prints created through electrolysis.