I take great pleasure in presenting our fall 2017 newsletter. For the first time in more than 15 years, our undergraduate enrollment is expected to dip slightly. But this is due in part to the College of Engineering initiating a “restricted admissions” policy, which is expected to have a small effect on numbers but a positive effect on the quality of our students. Professor Steve Eckels and the graduate committee have continued to grow the graduate program, and we are expecting more than 50 Ph.D. students this fall, for a total of more than 1,000 students.

The mechanical and nuclear engineering, or MNE, department has continued to hire excellent faculty members, and we welcome Jared Hobeck, assistant professor, and Ron Brockhoff and Jason Clement, both instructors, this fall. We now have 31 faculty members and are starting a search for two additional hires. Our new young faculty members are doing exceedingly well. Melanie Derby received a prestigious CAREER award from the National Science Foundation and James Chen was awarded a Young Investigator Award from the Air Force Office of Scientific Research. Several of our other faculty members have received new funding this year. You will be able to read about some of their accomplishments in this and upcoming newsletters.

In October, our undergraduate program will go through its accreditation review, and I want to thank Kevin Wanklyn and his undergraduate committee for the tremendous job they have done in getting the department prepared for the accreditation visit. Also in October, our industry advisory council will meet with the advisory councils of the College of Engineering and the other engineering departments, as we did last year.

I hope you find these newsletter articles about your MNE department interesting and exciting.
Melanie Derby, assistant professor of mechanical engineering, is the recipient of a $500,000 grant from the National Science Foundation’s Faculty Early Career Development, or CAREER, Program for her project “Altering Transient Soil Evaporation Mechanisms through Hydrophobicity.”

The award allows the up-and-coming researcher to focus on her interest in water conservation by investigating mixing water-repellent particles with soil in order to reduce evaporation rates. “Water is required to meet growing global food and energy needs,” Derby said, “and with decreasing Ogallala Aquifer levels, this is a timely problem relevant to the state of Kansas.” Initial experiments will first study evaporation from small soil pores and progressively move to large soil samples in controlled laboratory tests.

“Reducing irrigation by only 0.5 inches on irrigated farmland in Kansas would conserve 20 billion gallons of water annually,” Derby said.

As part of the educational component of the CAREER grant, Derby will introduce a graduate-level course on heat and mass transfer in the food/energy/water nexus and engage high school girls in hypothesis-driven experiments regarding evaporation from porous media with bread baking as an example.

“We encourage our young faculty members to be ambitious in applying for research funding,” said Bill Dunn, department head of mechanical and nuclear engineering. “I am extremely proud of Melanie Derby and her recognition as a CAREER recipient from the National Science Foundation. These awards carry a distinction that is recognized nationally.”

The NSF’s CAREER Program is one of its most prestigious awards for supporting early career faculty who effectively integrate research and education within the context of their institution’s mission. Faculty recognition and awards are an important part of Kansas State University’s plan to become a Top 50 public research university by 2025.
MNE PREPARES FOR 2017 ABET ACCREDITATION VISIT

In fall 2017, the mechanical engineering B.S. degree program will be evaluated by ABET. This degree program evaluation process is done every six years and consists of a written document of courses, student assessments, faculty qualifications and facilities, and a site-panel tour. ABET accreditation provides assurance that a degree program meets quality standards of the profession for which that program prepares graduates.

In preparation for this visit, MNE has created a notebook for each of the 11 required ABET “student outcomes.” Included in the notebook are examples of student work, separated by course, that show the fulfillment of that particular requirement. Similar notebooks are created highlighting assignments and tests for each MNE course.

MNE is a nonprofit, non-governmental accrediting agency for programs in applied science, computing, engineering and engineering technology, and is recognized as an accreditor by the Council for Higher Education Accreditation.

Developed by technical professionals from ABET’s member societies, accreditation criteria focus on what students experience and learn. ABET’s voluntary peer-review process is highly respected because it focuses on what students experience and learn. An ability to apply knowledge of mathematics, science and engineering

B. An ability to design and conduct experiments, as well as to analyze and interpret data.
C. An ability to design a system, component or process to meet desired needs, within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
D. An ability to function on multidisciplinary teams.
E. An ability to identify, formulate and solve engineering problems.
F. An understanding of professional and ethical responsibility.
G. An ability to communicate effectively.
H. The broad education necessary to understand the impact of engineering solutions on a global, economic, environmental, and societal context.
I. A recognition of the need for and an ability to engage in life-long learning.
J. A knowledge of contemporary issues.
K. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

NEW FACULTY JOIN MNE DEPARTMENT

Ronald Brockhoff joined the MNE faculty in fall 2017. He received his bachelor’s, master’s and doctoral degrees, all in nuclear engineering, from Kansas State University in 1992, 1994 and 2004, respectively. He worked in the KSTheoretical Physics Division at Los Alamos National Laboratory from 1993 to 1997, holding a Q-level security clearance and publishing a series of papers related to the use of MCNP for radiation transport and medical imaging analysis. In 1998, Brockhoff worked in the CD department at Topeka Technical College before taking a position as a software engineer at Networks Plus in Manhattan. He formed his own software development company, StaySys, Inc. in 2003. Brockhoff has acted as president of this corporation since its inception and is proficient in many programming languages including VB.Net, C++, Java and Xcode.

Brockhoff has authored or co-authored several journal articles on his research that focused on use of the MCNP transport code maintained by the Los Alamos National Laboratory. He used radiation transport calculations to develop simplified Skyline and Albedo approximations, developing a series of models to reconstruct phantom based on actual patient profiles, using these to analyze different potential CT scanner designs.

E. An ability to apply knowledge of mathematics, science and engineering.

A. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
IN THE CLASSROOM

Upgrades for MNE laboratories

This year the MNE Measurements and Instrumentation Laboratory and the Dynamic Systems and Controls Laboratory combined spaces. The new space was given a coat of paint and additional workstations, doubling the number of PCs available to students.

The lab concentrates on computer-based data acquisition, instrumentation and transducers for mechanical measurements. Each workstation consists of a PC, powered bread board, power supply, computer data acquisition system, oscilloscope, digital multimeter and motor lab. The lab also has standards for voltage, pressure, flow and temperature measurements, which are used for calibration purposes.

3D printing added to Engineering Graphics curriculum

3D printing has been adopted by numerous industries as a means of product development and prototyping. This saves time and money at the outset of the entire product development process, and ensures confidence ahead of production tooling. In response, a 3D printing module has been incorporated into the Engineering Graphics course, providing students with a basic understanding of the technology.

Students create a scaled-down version of the vise that is constructed in the IMSE 251 Manufacturing Processes Lab course, and are given completed physical vises to reverse engineer and scale into SolidWorks models prior to printing. They are allowed to personalize their vise by uniquely designing a hand wheel that interfaces with the existing design.

The new module has been in place for two semesters. Students enjoy the hands-on nature of the project and showing off their completed vises. Graphics instructors are continuing to tweak the project to make it better each semester.

Executive council names Brown as select scholarship recipient

Kansas State University student Michael Brown, Topeka, has been named a 2017 Praxair Engineers of Tomorrow Scholarship winner from the Executive Leadership Council. The scholarship is open to high-achieving undergraduate minority students currently attending a four-year college or university, and pursuing a mechanical or chemical engineering degree. Three scholarship awardees receive a one-time need-based scholarship of $12,000 each to assist with educational expenses for the 2017-2018 academic year.

Brown recently completed his freshman year in mechanical engineering.

The scholarship’s sponsor, the Executive Leadership Council, is a membership organization committed to increasing the number of global black executives in corporate America. Its scholarship programs is to build a pipeline of black corporate talent by supporting academic achievement, and development of black undergraduate and graduate students.

Brown has been appointed to the Kansas State University Student Foundation, was involved in the College of Engineering Student Council through Leaders in Freshmen Engineering, or LIFE, and served on the executive board for the National Society of Black Engineers at the university.

Before beginning his freshman year, Brown took part in the university’s Project Impact Kompass program, a three-day extended orientation program designed to accelerate academic success for incoming freshmen multicultural students in agriculture, business and engineering. Participants take “Guaranteed 4.0” training and participate in the university’s Challenge Course, team-building activities, workshops and business professional etiquette classes. The program extends into the first academic year with mentors, professional development and academic monitoring experiences.

“Michael is an exceptional young man, committed to his academics while successfully managing his time for involvement in important campus groups and activities,” said LaVerne Bitse-Baldwin, director of the Multicultural Engineering Program at Kansas State University. “I am extremely proud of his being recognized with this national scholarship.”

As a part of the award, Brown will attend the Engineering Leadership Council’s Honors Symposium, Oct. 22-26, which is designed to introduce scholarship recipients to a wide range of business-related careers and industries. The week begins in New York City where scholars visit major global companies and engage in one-on-one meetings with senior-level executives. They visit select cultural sites, and attend evening receptions and/or dinners with council members and other senior executives. The symposium experience concludes in Washington, D.C., with an annual recognition gala where scholarship recipients are recognized on stage.

Brown is a graduate of Topeka High School.
CREATIVE INQUIRY TEAMS

SAE AERO Design
Terry Beck – adviser
Competition: April 2017 – Loveland, Florida
Sponsors: MNE
The K-State SAE Aero Team competes annually in the SAE Aero Design competition. Students design and build a remote-controlled model aircraft in a team environment. During competition, a significant percentage of the score is devoted to the design report and oral presentation.

Kevin Wanklyn – adviser
Competition: May 2017 – Brooklyn, Michigan, Michigan International Speedway
June 2017 – Lincoln, Nebraska, Lincoln Airpark
The K-State SAE Formula Team, Powercat Motorsports, is a design-build team that develops a race car under Formula SAE competition rules. The team meets weekly throughout the school year.

Greg Spaulding – adviser
Competitions: May 2017 – Pittsburg, Kansas
April 2017 – German, California
Sponsors: Farrar Corporation and Grasshopper Mowers
The K-State SAE Mini Baja Team is a design-build team that creates a rugged, single-seat, off-road recreational vehicle for competition.

Windpower
Warren White – adviser
Competition: April 2017 – Boulder, Colorado
The K-State Wildcat Wind Power Team designs, builds and tests a wind turbine. Electrical and mechanical engineering students provide a combination of skills to design a reliable and efficient small-scale wind turbine.
This year’s team earned 2nd place at the 2017 Collegiate Wind Competition. The competition was held at the National Wind Technology Center under the United States Department of Energy in Boulder, Colorado. The team ran a wind turbine in a tunnel through a series of tests: manual braking, detection of loss-of-load safety braking, power production, cut-in wind speed and durability.

Rocketry
Warren White – adviser
Competition: June 2017 – Experimental Sounding Rocket Association/Intercollegiate Rocket Engineering Competition (ESRA/IREC)
Sponsors: K-State College of Engineering, MNE and ECE
Wildcat Rocketry Team students focus on rocketry, aeronautics, and engineering concepts and techniques. The team competes in national intercollegiate rocketry competitions, hosts community outreach activities and invites professionals to speak at club meetings.

AIAA Unmanned Aerial Systems
Dale Shinstock – adviser
Competition: June 2017 – Patuxent River, Maryland
Sponsors: NASA, MNE, ECE and CS
The K-State AIAA Student Chapter fosters learning about the aerospace field and the team creates an automated flight vehicle to performance.

TEAM MEMBERS WORK TOGETHER TO BUILD 2017 COMPETITION VEHICLE.

TEAM MEMBERS FINALIZE THEIR COMPETITION DESIGN.

SAE MINI BAJA COMPETITION IN PITTSBURG, KANSAS, WITH PITTSBURG STATE AND SOUTH AFRICA TEAMS.

WILDCAT ROCKETEER TEAM READY FOR LAUNCH AT 2017 IREC SPACEPORT AMERICA ESP, LAS CRUCES, TEXAS. FROM LEFT, DAMIAN LOYA AND JACOB CARPENCE, ECE; DANIEL FRANKLIN, MNE; AUSTIN JANTZ, PHYSICS; WARREN WHITE, MNE AND TEAM ADVISER, AND FRED HEINECKE, ECE.
CONGRATULATIONS MECHANICAL AND NUCLEAR ENGINEERING GRADUATES

Ph.D. graduates
Spring 2017
Ying Ma
Nuclear
Ryan G Fronk
Michael Anthony Reichenberger

M.S. graduates
Fall 2016
Kyle L McGahee
Adam Michael Saverino
Shane R Smith
Martin Thomas Squicciarini

Spring 2017
Monsuru Adeyinka Abass
Saqr Mofleh Alshogeathri
Tian Bai
Thomas Aaron Feldhausen
Jignesh Arvind Patel
Asrar Ahmed Syed
Abigail Maureen Weaver
Zayed Ahmed

B.S. graduates
with Nuclear Option
Spring 2017
Alexis Nevarez
William Garrett Parkins
Damien Parks
Jacob Scott Rigs
Preston Scott Robertson
Jeff Lynn Rosebaugh
Kendall David Schmidt
Jacob Otto Schwindt
Nathanael Arron Simeri
Jamie Michael Stadler
Trevor Nicholas Turner
Victoria Theresa Voigt
Justin David Watson
Trenton John Zamecnik

Timothy Bernard
Tyler Douglas Brown
Clark Andrew Busenitz
Brett Lee Champlin
Connor Franklin Clements
Ryan Cooper
Justin Currence
Kyle Lewis Davis
Jun Dong
Lee Evans
Zachary James Ferguson
Grant Patrick Ferland
Daniel Gregory Franken
Cameron Robert Gabler
Benjamin Joseph Garten
Nathan Scott Gladfelter
Larry T Gliniecki
Ulas Green
Matthew Justin Hale
Patrick Mason Harwell
Dominique Miguel Hoover
Gregory J Hopper
Philip Michalakis Hotz
Nicole Elizabeth Johnson
Samuel Robert Kafes
Shiqi Li
Daniel Douglas Lorenzen
Glenn Christian Luke
Yitao Luo
Devin Lee Magee
Aaron David Mason
Joshua Tyler Mathes
Jared McLaughlin
Lindsey Nicole Merrill
Trenton Midyett
Cody Albert Nieman
Julia Grace Nyhiro
Shaun Joseph O’Brien
Adam David Osheim
Ryan Andrew Pauly
Benjamin Alexander Peterson
Kyle Eric Polson
Brian Christopher Price
Sage M Ratliff
Jared Michael Reese
Michael Wesley Reimer
Cody Matthew Rethman
Glen Allen Riley
Cameron Todd Rohleder
Thomas Cole Sauber
Daniel Joseph Schapiraz
Emma Anne Schinstito
Eric Schlaikjer
Benjamin Howard Schmanke
Jingbo Shi
Matthew Stalder Shobe
Aaron Cody Smith
Allison Elizabeth Sommer
Grant Michael Stevens
Mason Stewart
Calder Chase TenEyck
Tyler Scott Allen Thiel
Logan Dean Thomas
Martin John Thompson
Keegan Douglas Tilton
Nicholas William Urr
Andrew Tyler Walsten
Daniel Patrick Wheeler
Brett Stephen Wilson
Leidong Xu
Joshua Joseph Yonkin
Lu Zhang

EDUCATION
K-State Mechanical and Nuclear Engineering
10

Nuts, Bolts and Neutrons • Fall 2017
11
The triboelectric effect is a phenomenon wherein one material becomes electrically charged after contact with a different material through friction. Harvesting the electrical charge created by this process through nanotechnology provides an opportunity for devices to operate on a very small scale. With the world’s increasing demand for energy, harvesting of this buildup of electrical charge may hold an opportunity for generation of electricity.

Using computational techniques with supercomputers, James Chen, assistant professor, and lead investigator, and Zayd Leseman, associate professor, both MNE, will undertake a project to provide a theoretical framework for engineering triboelectric nanogenerators capable of harvesting significant amounts of this power in a controlled way. This research involves many disciplines including contact mechanics, solid mechanics, materials science, electrical engineering and manufacturing. Chen and Leseman will perform simulations in conjunction with carefully designed experiments to derive an atomistic electrodynamic theory and integrate it into the simulations.

Outcomes of this project will not only unmask lurking mysteries of the triboelectric phenomenon,” Chen said, “but provide a platform for students — middle schoolers to college — to understand energy harvesting.”

The project will bolster three centers in the College of Engineering — the SMART Lab, Kansas State Microanalysis Lab and Beocat — while enhancing the research program of the mechanical and nuclear engineering department. It will also directly impact the 2025 initiative and its goal of Kansas State University being recognized as a Top 50 public research university.
For many students, summer is a time to travel and explore new opportunities. Since 2011, a group of students from India has been doing just that — at Kansas State University. Students from Gujarat Technical University, or GTU, complete two eight-week courses in engineering taught by K-State faculty on the Manhattan campus.

“The Engineering Summer Institute has proven to be a very important step toward increased internationalization of the campus — part of K-State’s 2025 vision,” said Mohammad Hosni, MNE professor at K-State. “It brings students to the campus, not only teaching them technical courses, but also helping them understand the culture in the United States.”

Each student that attends has passed national university entrance exams and GTU requirements. All of the students have strong technical and academic backgrounds.

“Students will receive credit for these courses as part of their curriculum, but also helping them understand the culture in the United States.”

Students will receive credit for these courses as part of their curriculum at their institution, and this provides the opportunity for them to possibly seek graduate school admission at K-State or another institution upon graduation,” Hosni said. “It gives them more options to see something outside of India.”

K-State began its distance education program in 1966, and through the decades has stayed on the edge of developing technology to make K-State education more accessible to adult learners all over the world. Over the years, K-State has utilized audioconferencing, telecourses on PBS, VHS tapes and currently — use of the internet. According to the U.S. Department of Education’s National Forum on Education Statistics, virtual education is now part of the planning agenda of most organizations concerned with education and training.

A few years ago, K-State nuclear faculty conducted a thorough assessment of the Navy's Bettis Reactor Engineering School (BRES). They determined BRES graduates could transfer up to 12 hours of credit toward an M.S. in nuclear engineering. It is now possible for Navy personnel to complete their entire degree online through K-State Global Campus, and the department of mechanical and nuclear engineering.

In December 2017, MNE will award its first distance M.S. in nuclear engineering through a new distance education collaboration with the U.S. Navy. Lieutenant Commander Michael Fuller was able to complete his online degree in just two years with transfer credit hours from the Bettis Reactor Engineering School. The courses transferred were physics, reactor dynamics, radiological fundamentals and heat transfer.

“I decided to pursue a degree online due to my professional status,” Fuller said, “and I believed in distance learning’s feasibility due to the availability of electronic lectures and correspondence with professors. I chose K-State because of the reputation of its nuclear engineering program.”

Fuller currently holds a senior reactor operator license from the Nuclear Regulatory Commission and works for a commercial nuclear power plant in that capacity. He plans to use his additional education to move up in the commercial nuclear industry and start contractor work.
### LEADERSHIP

**Mechanical and Nuclear Engineering**

**HONOR ROLL OF GIVING**

**July 1, 2016 – June 30, 2017**

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We sincerely thank you for your generosity and support.
NOTICE OF NONDISCRIMINATION
Kansas State University prohibits discrimination on the basis of race, color, ethnicity, national origin, sex (including sexual harassment and sexual violence), sexual orientation, gender identity, religion, age, ancestry, disability, genetic information, military status, or veteran status, in the University’s programs and activities as required by applicable laws and regulations. The person designated with responsibility for coordination of compliance efforts and receipt of inquiries concerning nondiscrimination policies is the University’s Title IX Coordinator: the Director of the Office of Institutional Equity, equity@k-state.edu, 103 Edwards Hall, Kansas State University, Manhattan, Kansas 66506-4801, 785-532-6220. The campus ADA Coordinator is the Director of Employee Relations, charlott@k-state.edu, who may be reached at 103 Edwards Hall, Kansas State University, Manhattan, Kansas 66506-4801, 785-532-6277. Revised July 7, 2015.

CORDLESS DRILL GAMES

PROJECTS DISPLAYED OUTSIDE THE ENGINEERING COMPLEX FOR “CORDLESS DRILL GAMES,” A SMALL GROUP ASSIGNMENT FOR THE ME101 CLASS, HELD AT THE END OF EACH SEMESTER.