Table of Contents

3 Faculty Profiles

11 Journal Articles

23 U.S. Patents
   Editorial Positions
   Honors and Major Awards
   Major Invited and Keynote Presentations
   Invited University Seminars and Other Presentations
   Other Accolades

31 Industry-Sponsored Capstone Projects and Sponsors
I am delighted to share with you the creative, scholarly achievements of the Mechanical Engineering faculty members and their students for the 2015-2016 calendar years.

During the biennium, our 19 tenured and tenure-track faculty members authored or co-authored 130 refereed journal articles, books, and book chapters. Six U.S. patents were secured. Overall, the faculty held 27 editorial positions in service to a variety of journals and other publications. Also during the biennium, our scholarly work was cited over 12,000 times (source: Google Scholar), reflecting the impact of our research worldwide.

As testament to our commitment to partner with industry, our faculty members have advised hundreds of undergraduate students on 44 industry-sponsored capstone projects over the past two years. We are proud to recognize our capstone students in this Report, and thank the visionary sponsors with whom they have worked on their major design experiences.

Our inaugural Mechanical Engineering Biennial Report was presented in 2013, covering achievements in the 2011-2012 calendar years. In the four years since the first Report, the number of journal articles, books, and book chapters published by the faculty on an annual basis has doubled, while the number of patents received annually has increased six-fold. Our editorial positions have increased by 150%, and the annual citations of our research have grown by 70%. The number of industry-sponsored capstone projects over the respective biennia has expanded from 7 to 44.

We look forward to sharing more exciting achievements in the future. I hope you enjoy reading about the individual contributions of our faculty members in the pages that follow.

Sincerely,

Theodore L. Bergman
Charles E. & Mary Jane Spahr Professor
Chairman, Department of Mechanical Engineering
The University of Kansas
Theodore L. Bergman  
Charles E. & Mary Jane Spahr Professor  
Chair, Department of Mechanical Engineering  
Ph.D. Purdue University, 1985

Dr. Bergman joined KU in 2012. He was previously a faculty member at the University of Connecticut (1996 – 2012) and The University of Texas at Austin (1985 –1996). From 1998 to 2004 he was Head of the Mechanical Engineering Department at UConn and served as Associate Dean of Engineering for Research and Outreach in 2004 and 2005, also at the University of Connecticut. He directed the Thermal Transport Processes Program at the National Science Foundation from 2008 to 2010. Early in his career, Dr. Bergman worked at Black & Veatch as a design engineer.

Dr. Bergman conducts research in the thermal sciences as applied to advanced manufacturing and energy systems. He is a co-author of several heat transfer texts, has served as an Associate Editor for the ASME Journal of Heat Transfer as well as Frontiers in Heat Transfer, and has received a number of awards including the NSF Presidential Young Investigator Award, the ASME Heat Transfer Division Best Paper Award, and the ASME Melville Medal. Dr. Bergman is a Fellow of the American Society of Mechanical Engineers.

Thomas H. DeAgostino  
Associate Professor of the Practice  
M.S., Rensselaer Polytechnic Institute, 1995

Mr. DeAgostino joined the Department of Mechanical Engineering in 2015. He was previously at the Lawrence Technological University in Southfield, Michigan, where was Director of the Entrepreneurial Engineering Design Studio. Before LTU, he was at Trine University, and held the title of Executive Director of Innovation One, Trine’s technology and business incubator. Mr. DeAgostino has 25 years of practical engineering experience at Ford and General Motors.

Christopher Depcik  
Docking Faculty Scholar, Associate Professor  
Ph.D. University of Michigan, 2003

Dr. Depcik joined the Department of Mechanical Engineering in 2008. He previously worked at the University of Michigan as a post-doctoral research fellow. Dr. Depcik conducts research pertaining to sustainable energy usage and the transportation infrastructure including Feedstock-to-Tailpipe analyses of fuel production and its subsequent combustion including the influence of the feedstock and fuel on exhaust emissions. Also of interest is energy recovery utilizing multiple feedstocks and different fuels. A major effort is the development of predictive models for catalytic exhaust aftertreatment devices.

Dr. Depcik’s EcoHawks students design and research electrified vehicles and renewable energy sources, including the interconnection of the vehicles and energy sources with the electrical grid. He is a member of both the American Society of Mechanical Engineers and the Society of Automotive Engineers (SAE). In 2012 he received the SAE Ralph R. Teetor Educational Award in recognition of his transportation-related research and educational activities.
Faculty Profiles

Ronald L. Dougherty
Professor
Executive Associate Chair
Ph.D. University of Missouri – Rolla (Missouri University of Science & Technology), 1978

Dr. Dougherty joined KU in 1999. He was previously at Oklahoma State (1985 – 1999), and worked in industry at Pratt & Whitney (1978 – 1982) and Terra Tek (1982 – 1985). He served as Chair of the Mechanical Engineering Department for 13 years, from 1999 to 2012. His areas of research include laser diagnostics, particulate characterization, two-phase fluid flow and heat transfer, power plant thermal modeling, pumping systems, boiling, glaucoma flow modeling and experimentation, as well as forensic blood spatter.

Dr. Dougherty is a Fellow of the American Society of Mechanical Engineers, an Associate Fellow of the American Institute of Aeronautics and Astronautics, and a member of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers. He served for nearly two decades as an Associate Editor for the AIAA Journal of Thermophysics and Heat Transfer, and he is a Registered Professional Engineer in Oklahoma.

Huazhen Fang
Assistant Professor
Ph.D. University of California, San Diego, 2014

Dr. Fang joined the University of Kansas in the Fall of 2014. He received his Ph.D. in Mechanical Engineering from the University of California, San Diego in 2014, where he developed advanced control systems and algorithms for energy management and environmental monitoring applications. He has industrial experience at NEC Laboratories America and Mitsubishi Electric Research Laboratories.

Kenneth J. Fischer
Professor
Ph.D. Stanford University, 1995

Dr. Fischer joined the Department of Mechanical Engineering in 2000. He holds secondary faculty appointments in the Departments of Orthopedic Surgery as well as in Physical Therapy and Rehabilitation Sciences at the University of Kansas Medical Center. He was previously a faculty member at the University of Pittsburgh (1995 – 2000). Early in his career, Dr. Fischer worked at Boeing as a systems engineer and in manufacturing research and development. Dr. Fischer conducts research in musculoskeletal biomechanics. He has served as an Associate Editor for the ASME Journal of Biomechanical Engineering and is a member of the American Society of Mechanical Engineers, the American Society of Biomechanics, the Orthopaedic Research Society, and the American Society for Engineering Education.
Elizabeth A. Friis  
Associate Professor  
Ph.D. Wichita State University, 1994

Dr. Friis joined KU in 2001. Previously, she was a Research Scientist at the Orthopaedic Research Institute from 1987 to 2001. Dr. Friis’ main research interests are in biomaterials and biomechanics, with emphasis in spine biomechanics and mechanical testing and design of implants. Dr. Friis has led several efforts at KU to incorporate technology entrepreneurship education into the engineering curriculum.

Dr. Friis has served on the Editorial Board of The Journal of Biomedical Materials Research – Part A since 2007. In 2004, Dr. Friis was a Kauffman Entrepreneurial Faculty Scholar and was in the charter class of an entrepreneurial development program (PIPELINE) in 2007. She served as the Director of the Graduate Fellowship Program for the Institute for Advancing Medical Innovation from 2009 to 2011. Dr. Friis has received several National Science Foundation and National Institutes of Health Small Business Innovation Research awards, and has licensed technologies that are currently commercialized.

Gibum Kwon  
Assistant Professor  
Ph.D. University of Michigan, 2014

Dr. Kwon joined KU in 2016. He received his Ph.D. in Materials Science and Engineering from the University of Michigan in 2014 where he was awarded a Materials Research Society (MRS) Graduate Student Silver Award (2013) and multiple poster awards. From 2014 to 2016, he worked as a Postdoctoral Associate at the Massachusetts Institute of Technology where he conducted research on photo-responsive semiconducting materials. Dr. Kwon’s current research interests include superomniphobic surfaces, liquid-liquid separations, hydrate-phobic surfaces, self-healable coatings and patterned surfaces.

Xianglin Li  
Assistant Professor  
Ph.D. University of Connecticut, 2012

Dr. Li joined the Mechanical Engineering Department in 2014. He received his Ph.D. in Mechanical Engineering from the University of Connecticut in 2012, where he investigated the electrochemical, as well as heat and mass transfer aspects of advanced fuel cell and battery concepts. Most recently, Dr. Li served as a Senior Scientific Engineering Associate at the Lawrence Berkeley National Laboratory, where he was involved with full fuel cycle analysis of non-conventional natural gas production and usage, as well as appliance efficiency standards in residential, commercial, and industrial applications.
Faculty Profiles

Lin Liu
Assistant Professor
Ph.D. Iowa State University, 2011

Dr. Liu joined the Mechanical Engineering Department in 2013. Dr. Liu received his Ph.D. in Mechanical Engineering from Iowa State, where he developed models to predict both the electrochemical performance and the structural reliability of solid oxide fuel cells. Dr. Liu most recently was a post-doctoral fellow at the University of Michigan, Ann Arbor where he investigated the degradation mechanisms leading to the failure of lithium-ion batteries. He has industrial experience at General Motors and The Stanley Works.

Carl W. Luchies
Associate Professor
Ph.D. University of Michigan, 1991

Dr. Luchies joined the Department of Mechanical Engineering in 1996. He was previously an Engineering Physics faculty member at Hope College (1991 – 1996). At KU, Dr. Luchies has served as the Interim Director of the Human Performance Laboratory at the KU Medical Center (2004 – 2006) and as Academic Director of the Bioengineering Graduate Program (2007 – 2010). He holds a secondary faculty appointment in the Department of Physical Therapy and Rehabilitation Science at the KU Medical Center.

Dr. Luchies’ research involves integration of methodologies of mechanical engineering with the biological and medical sciences to study the mechanics of the human musculoskeletal system. Experimental studies, mathematical modeling, and computer simulations are conducted to produce insights into the biomechanics of human balance and motor control related to aging and neurological disease. Dr. Luchies collaborates with colleagues in the KUMC Center on Aging, Movement Disorders Clinic, and Molecular and Integrative Physiology. He is a member of the Society of Neuroscience.

Lorin P. Maletsky
Professor
Associate Dean, School of Engineering
Ph.D. Purdue University, 1999

Dr. Maletsky began teaching at the University of Kansas in 2000. His courses are in the design and mechanics tracks of the curriculum, and he also offers graduate courses in dynamics and manufacturing.

Dr. Maletsky’s research area is machine design and biomechanics, specifically the experimental testing of cadaveric joints using custom-designed physiological loading equipment. Graduates from his laboratory hold positions in a number of the world’s largest orthopedic companies, as well as in academia and in other industries. He is a member of the Bioengineering Division of ASME and is also a member of the Orthopedic Research Society and the American Society for Engineering Education.
Steven A. Soper  
Foundation Distinguished Professor  
Director, Center for BioModular Multi-Scale Systems for Precision Medicine  
Ph.D. University of Kansas, 1989

Dr. Soper joined the University of Kansas in 2016, and holds joint appointments in the Departments of Chemistry and Mechanical Engineering. He was previously a faculty member in the University of North Carolina/North Carolina State University Joint Department of Biomedical Engineering and the UNC Department of Chemistry (2011 – 2016) as well as in the Departments of Chemistry, Mechanical Engineering, and Biological Sciences at the Louisiana State University (1991 – 2011). Dr. Soper also holds the title of World Class University Professor at Ulsan National Institute of Science and Technology, South Korea.

As one of only 12 Foundation Distinguished Professors, Dr. Soper holds the highest academic rank at the University. He conducts research in novel biomedical devices, concentrating on in vitro cancer diagnostics based on lab-on-a-chip technologies. Dr. Soper is a Fellow of the Society for Applied Spectroscopy, the Royal Society of Chemistry, and the American Association for the Advancement of Science. Among the many awards he has received are the 1992 R&D 100 Award, the 1994 Shannon Award from the National Institutes of Health, the 1995 Whitaker Foundation Award, The American Chemical Society Award for Achievements in Chemical Instrumentation, and numerous university-level recognitions for research.

Robert M. Sorem  
Associate Professor  
Ph.D. University of Kansas, 1991

Dr. Sorem joined the Department of Mechanical Engineering in 1994. He previously worked for Schlumberger Oilfield Services from 1991 to 1994 in Research and Engineering, developing downhole oilfield tools. Dr. Sorem served as Associate Dean for Undergraduate Studies in the School of Engineering for the 2002 – 2012 academic years.

Dr. Sorem’s research areas are engineering education, computational mechanics and vehicle dynamics. His work in education is focused on retention strategies and graduation rates. He has advised KU’s Jayhawk Motorsports Formula SAE (Society of Automotive Engineers) Racing Team for 19 years. In 2012 and 2014 Jayhawk Motorsports won the Formula Hybrid – Electric Division and the Formula SAE Lincoln events. In 2009 Dr. Sorem was awarded the Carroll Smith Mentor’s Cup by Formula SAE and the Sports Car Club of America (SCCA).
Faculty Profiles

Paulette Spencer  
Deane E. Ackers Distinguished Professor  
Director, Institute for Bioengineering Research  
Ph.D. University of Missouri-Kansas City, 1993  
D.D.S. University of Missouri-Kansas City, 1978

Dr. Spencer joined KU in 2007. She was previously a faculty member at the University of Missouri-Kansas City School of Dentistry (1998 – 2007) and is a Curators’ Professor Emerita from the University of Missouri. Working with her research team, Dr. Spencer designs, synthesizes, and develops novel biomaterials for the reconstruction of mineralized tissues damaged by disease, age or trauma.

Dr. Spencer’s work has been continuously funded by the National Institutes of Health for more than 20 years. She has served as Mentor on 4 NIH-supported career development awards and as Director of a NIH-supported training program. She serves on several editorial review boards, is a past member of the Center for Scientific Review, NIH (2010 – 2012), and was Visiting Professor at the Bauru School of Dentistry, University of Sao Paulo in 2009. She is a Fellow of the American Institute for Medical and Biological Engineering, the Biomaterials Science and Engineering International Union of Societies for Biomaterials Science and Engineering, the American College of Dentists, and the American Association for the Advancement of Science.

Karan S. Surana  
Deane E. Ackers Distinguished Professor  
Ph.D. University of Wisconsin, 1970

Dr. Surana joined the Department of Mechanical Engineering in 1984. He had previously worked at Structural Dynamics Research Corporation (1970 – 1973) as a Special Consultant, Engineering Mechanics Research Corporation (1973 – 1978) as Director of Research and Development, and McDonnell Douglas in St. Louis as Principal Consultant. Over this period he was the principal architect, originator and developer of the commercial finite element software systems IDEAS, NISA and FINESSE.

Dr. Surana conducts research in computational mathematics, computational mechanics, and continuum mechanics including development of constitutive theories. His work on the k-version of the finite element method is one of his most notable contributions. Dr. Surana’s current research foci include ordered-rate constitutive theories in addition to fundamental and applied topics in computational mathematics. He serves as an Associate Editor for The International Journal for Computational Methods in Engineering Science and Mechanics and The International Journal of Modeling and Simulation. Dr. Surana is a member of International Association for Computational Mechanics and is a life member of the American Society of Mechanical Engineers.
Candan Tamerler  
Wesley G. Cramer Professor  
Ph.D. Bogazici University, 1997

Dr. Candan Tamerler joined KU in the Fall of 2013. She was previously the Assistant Director of the Genetically-Engineered Materials Science & Engineering Center at the University of Washington. She was also a Full Professor at Istanbul Technical University, and served as the Chair of the Molecular Biology and Genetics Department at ITU for eight years, concurrently holding a visiting professor position at the University of Washington. While at ITU, Professor Tamerler founded the Molecular Biology and Biotechnology Research Center, a multi-disciplinary initiative involving faculty members from Chemical Engineering, Materials Science and Engineering, Mechanical Engineering, Chemistry, Molecular Biology, and Physics.

Dr. Tamerler’s research is at the intersection of engineering, biology, and nanotechnology. Her most notable contributions include the design of biomolecular recognition based self-assembled hybrid methods for medicine and biotechnology. She has been awarded visiting scientist and professorship positions at Nagoya University and the University of Westminster. Tamerler is a Fellow of both the Turkish Academy of Sciences and the American Institute for Medical and Biological Engineers.

Peter W. TenPas  
Associate Professor  
Ph.D. Iowa State University, 1990

Dr. TenPas joined the Mechanical Engineering Department in 1987. Early in his career he worked as a research engineer in the fluid mechanics research group at the Trane Company Corporate Research Laboratory. While at KU, he has served as the Director of the KU Industrial Assessment Center and the KU Energy Analysis and Diagnostic Center. Under these U.S. Department of Energy supported programs, Dr. TenPas led student teams to assess the potential of energy conservation and waste reduction opportunities at many industrial facilities in the region.

Dr. TenPas’ research interests are in the areas of Computational Mechanics and Computational Fluid Dynamics. He has published in the areas of viscous flow with heat transfer, compressible flow, aero-acoustics, and modeling of visco-elastic fluids. He is a member of the American Institute of Aeronautics and Astronautics, the American Society of Engineering Education, and the American Society of Mechanical Engineers.
Faculty Profiles

Sara E. Wilson
Associate Professor
Director, Bioengineering Program
Ph.D. Massachusetts Institute of Technology, 1999

Dr. Wilson joined the Department of Mechanical Engineering in 2001. In addition, she has a courtesy appointment in Physical Therapy and Rehabilitation Sciences at the University of Kansas Medical Center. Prior to KU, she was a postdoctoral researcher at the University of Virginia.

Dr. Wilson conducts research in the neuromuscular control of human motion using engineering principles from control theory and dynamics. She has studied the effects of occupational exposures such as vibration on the lumbar spine and low back disorders. She is also involved in the development of medical devices used in physical therapy, obstetrics and internal medicine. She has served as an Associate Editor for the Journal of Applied Biomechanics and is currently the Chair of the Executive Committee of the ASME Bioengineering Division. She is also active in teaching in the area of responsible conduct of research for graduate students in engineering. Dr. Wilson is a member of the American Society of Mechanical Engineers, the American Society of Biomechanics, and the American Society for Engineering Education.

Xinmai Yang
Associate Professor
Ph.D. Boston University, 2003

Dr. Yang joined the Department of Mechanical Engineering in 2008. He was previously a postdoctoral research associate at Washington University in St. Louis (2006 – 2008). He has also worked at the National Center for Physical Acoustics at the University of Mississippi as a postdoctoral fellow. Dr. Yang conducts research in photoacoustic imaging and biomedical applications of ultrasound.

Dr. Yang’s research focuses on early cancer detection, as well as molecular imaging and brain functional imaging with both optical and/or ultrasound methods. His research is funded by the National Institutes of Health. Dr. Yang is a member of Society of Photographic Instrumentation Engineers, and is an associate member of the Acoustical Society of America.
The Jimmy Green Statue, The University of Kansas, Bronze by Daniel Chester French, 1924.

An engineering student (left) conversing with James Woods Green, first dean of the KU School of Law (right). This is believed to be the world’s first larger-than-life sculpture of either a university faculty member or a university student.
**Journal Articles**

**Theodore L. Bergman**


**Christopher Depcik**


* Excludes online pre- or post-publications. Includes book chapters.
Journal Articles

(Depcik, cont.)


Huazhen Fang


Kenneth J. Fischer


Journal Articles


**Elizabeth A. Friis**


**Gibum Kwon**


**Xianglin Li**


**Lin Liu**


P. Guan and L. Liu, “Phase-field simulation of lithium ion diffusion in solid electrolyte interphase,” *ECS Transactions*, vol. 66, pp. 81-91, 2015.
Journal Articles

(Liu, cont.)


Carl W. Luchies


Lorin P. Maletsky


Journal Articles

(Maletsky, cont.)


Steven A. Soper


Journal Articles

Paulette Spencer


(Spencer, cont.)


Karan S. Surana


Journal Articles

(Surana, cont.)


Candan Tamerler


**Journal Articles**

**Sara E. Wilson**


**Xinmai Yang**


• U.S. Patents
• Editorial Positions
• Honors and Major Awards
• Major Invited and Keynote Presentations
• Invited University Seminars and Other Presentations
• Other Accolades

U.S. Patents

Huazhen Fang


Elizabeth A. Friis


Gibum Kwon


Steven A. Soper


Candan Tamerler


Book

Editorial Positions

Theodore L. Bergman


Ronald L. Dougherty


Kenneth J. Fischer


Elizabeth A. Friis


Steven A. Soper


Paulette Spencer


Editorial Positions

Karan Surana


Candan Tamerler


Associate Editor, *Nano Communications*, 2013 – 2015.


Sara E. Wilson


Honors and Major Awards

Theodore L. Bergman

Fellow, American Society of Mechanical Engineers.

Ronald L. Dougherty

Fellow, American Society of Mechanical Engineers (elected, 2015).

Huazhen Fang

Outstanding Reviewer Award, IEEE Transactions on Cybernetics (2016).

Carl W. Luchies

Outstanding Teaching Award, American Society of Engineering Education Midwest Section (2016).

Steven A. Soper

Fellow, American Association for the Advancement of Science.

Fellow, Society for Applied Spectroscopy.

Fellow, The Royal Society of Chemistry.

Paulette Spencer

Fellow, Biomaterials Science and Engineering, International Union of Societies for Biomaterials.

Fellow, American Association for the Advancement of Science.

Fellow, American Institute for Medical and Biological Engineering.

Fulbright Scholar Award (Brazil, 2015).
Honors and Major Awards

Karan S. Surana

Life Member, American Society of Mechanical Engineers.

Fellow, American Society of Mechanical Engineers.

Candan Tamerler

Fellow, American Institute of Medical and Biological Engineering (elected, 2016).

Fellow, Turkish National Academy of Science.

Major Invited and Keynote Presentations

Kenneth J. Fischer


Karan S. Surana


Candan Tamerler


Invited Speaker, “Biology enabled nanotechnology: from surfaces to biologically integrated hybrid materials” and “Molecular biomimetic approaches for hard-to-soft interfaces,” 40th International Conference and Exposition on Advanced Ceramics and Composites, Daytona Beach, FL, 2016.


Invited University Seminars and Other Presentations

Christopher Depcik

“Unique particulate filter and catalyst modeling activities at KU,” Department of Chemical Engineering, Chalmers University of Technology, Goteborg, Sweden, 2016.

Candan Tamerler


“Biology enabled nanotechnology: from assembly to synthesis,” Materials Science and Engineering Colloquium Series, Boston University, Boston, MA, 2015.

Xinmai Yang

“Anti-vascular photo-mediated ultrasound therapy,” Institute of Acoustics, Tonji University, Shanghai, China, 2016.

“Anti-vascular photo-mediated ultrasound therapy,” Department of Ophthalmology, Nanjing Medical University, Nanjing, China, 2016.

Other Accolades

Christopher Depcik

Invited speaker, KU-ELEVATE (one of four speakers to showcase innovative research at the University of Kansas), Wichita, 2016.

Robert M. Sorem

Recipient of the H.O.P.E Award, (in recognition by the senior class to honor the single outstanding progressive educator at the University of Kansas), 2016.

Paulette Spencer

Recipient of the Higuchi-KU Endowment Research Achievement Award: Dolph Simons Award in Biomedical Sciences (in recognition of significant research accomplishments among the faculty at all Kansas Board of Regents institutions), 2015.

Candan Tamerler

Industry-Sponsored Capstone Projects

Sponsors

Capstone of Spooner Hall, Unknown Artist, 1894, The University of Kansas.
Industry-Sponsored Capstone Projects

The following are industry-sponsored capstone projects in effect from January of 2015 to December of 2016.

**Abrasion Resistant Wires & Methods of Testing**  
**Sponsor:** WireCo WorldGroup  
Industrial Liaison: Bamdad Pourladian  
Instructor: Tom DeAgostino  
Advisor: Candan Tamerler  
Student Team: Will Plamann, Tony Raper, Kevin Rongish

**Abrasion Resistant Wires & Testing Methods**  
**Sponsor:** WireCo WorldGroup  
Industrial Liaison: Bamdad Pourladian  
Instructor: Tom DeAgostino  
Advisor: Candan Tamerler  
Student Team: Matt Barnes, Alex Furst, Jose Jaramillo, Alex Whitten

**ABS (Braking) Simulator**  
**Sponsor:** Honda R&D Americas, Inc.  
Industrial Liaison: Colter Ragone  
Instructor: Tom DeAgostino  
Advisor: Chris Depcik  
Student Team: Thomas Ezell, Tre Pedigo, Alexandra Tucci

**Alternative Walker Design**  
**Sponsor:** Oread Medical  
Industrial Liaison: Jody Crookshanks and John Thomas  
Instructor: Tom DeAgostino  
Advisor: Lisa Friis  
Student Team: Blake Karnes, Eva Mohr, Logan Sidener, Ana Villanueva

**Bandage Removal System/Device**  
**Sponsor:** KU Innovation and Collaboration  
Industrial Liaison: Stephen Waller, MD  
Instructor: Ron Dougherty  
Advisor: Ted Bergman  
Student Team: Levi Brunton, Jay Patterson, Phillip Shields

**Battery Chemistry Analysis**  
**Sponsor:** Altec  
Instructor: Chris Depcik  
Advisor: Chris Depcik  
Student Team: Blake Hamilton, Austin Kipp

**CFD Thermal Flow Analysis**  
**Sponsor:** HCI Energy  
Industrial Liaison: Brian Sarsfield  
Instructor: Tom DeAgostino  
Advisor: Ted Bergman  
Student Team: Brett Hustead, Carson Lee, Cord Trees

**Cold Cracking of Plastic Jacketing**  
**Sponsor:** WireCo WorldGroup  
Industrial Liaison: Bamdad Pourladian  
Instructor: Tom DeAgostino  
Advisor: Sara Wilson  
Student Team: Jared Bohaty, Luke Moore, Garrett Woolridge, Yu Zhou

**Computational Fluid Dynamics Model of Nozzle Spray Pattern and Mixing in Combustion after Treatment**  
**Sponsor:** John Zink Hamworthy  
Industrial Liaison: Steve Bortz  
Instructor: Tom DeAgostino  
Advisor: Ron Dougherty  
Student Team: Greg Agnew, Eric Burkemper, Alan Vila

**Consumer Care Fill/Pack Line Changeover Optimization**  
**Sponsor:** Bayer HealthCare Animal Health  
Industrial Liaison: John Caldwell  
Instructor: Tom DeAgostino  
Advisor: Mark Shiflett  
Student Team: Raman Singh, Jen Sheng Yong, Sammy Zuehlke

**Enthalpy Feedback Control for a Conditioning Energy Recovery Ventilator**  
**Sponsor:** Build Smart  
Industrial Liaison: Adam Cohen, Paul Grahovoc, and Jason Morosko  
Instructor: Tom DeAgostino  
Advisor: Huazhen Fang and Xianglin Li  
Student Team: Trey Fox, Josh Slocum, Kyle Strickland, Cooper Wedel
Industry-Sponsored Capstone Projects

**Esophagus Cell Collection Device**  
*Sponsor: KU Innovation and Collaboration*  
Industrial Liaison: Ajay Bansal, M.D.  
Instructor: Ron Dougherty  
Advisors: Nourouddin Sharifi and John Stark  
Student Team: Hadi Alzuabi, Nick Baker, Ryan Baskins, Parker Gill

**Jaram Glass Cut Test Bench 1**  
*Sponsor: BD Medical*  
Industrial Liaison: Kurt Palik  
Instructor: Tom DeAgostino  
Advisor: Carl Luchies  
Student Team: Conner Brown, Sean Luenz, Elaine Steve, Andrew Wacker

**Glass Cut Test Bench 2**  
*Sponsor: BD Medical*  
Industrial Liaison: Kurt Palik  
Instructor: Tom DeAgostino  
Advisor: Lorin Maletsky and Tom DeAgostino  
Student Team: Michael Barber, Jose Betancourt, Taylor Block, Hannah Davidson

**Glass Cut Test Bench 3**  
*Sponsor: BD Medical*  
Industrial Liaison: Kurt Palik  
Instructor: Tom DeAgostino  
Advisor: Ron Dougherty  
Student Team: Michael Barber, Maverick Moore, Timothy Stubbs, Alden Woodward

**Glass Cut Test Bench 4**  
*Sponsor: BD Medical*  
Industrial Liaison: Kurt Palik  
Instructor: Tom DeAgostino  
Advisor: Ron Dougherty  
Student Team: Matt Allen, Anirudh Ashok Kumar, Erin Langan, Zachary Yunk

**HEMCO Blower Testing Apparatus**  
*Sponsor: HEMCO*  
Industrial Liaison: Ron Hill and Dave Campbell  
Instructor: Ron Dougherty  
Advisor: Ron Dougherty  
Student Team: Cory Bondurant, James Clayton, Alan Kidd, Jake Wernel

**Honda Odyssey Control Arm Design**  
*Sponsor: Honda R&D Americas*  
Industrial Liaison: Chris Dundon  
Instructor: Robb Sorem  
Advisor: Ron Dougherty  
Student Team: Royce Kigore, Jason Morris, Alex Sanou-bane, Bailey Spickler

**Hybrid Battery Repurpose Study**  
*Sponsor: Westar Energy*  
Industrial Liaison: Hal Jensen  
Instructor: Tom DeAgostino  
Advisor: Chris Depcik  
Student Team: Kyler Cowsert, Jonathan Salzetti, Alvaro Papa Silva, Simon Qiu

**Improving Shear Testing Device for WireCo**  
*Sponsor: WireCo WorldGroup*  
Industrial Liaison: Bamdad Pourladian  
Instructor: Ron Dougherty  
Advisor: Ron Dougherty  
Student Team: Cameron Henry, Patrick Loftus, Vanessa Sillman

**Invitro Fertilization Holding/Sealing System**  
*Sponsor: KU Innovation and Collaboration*  
Industrial Liaison: Sam Kim, MD  
Instructor: Ron Dougherty  
Advisor: Sarah Kieweg  
Student Team: Matthew Canter, Matthew George, Kelly Kerr, T.J. Zimmerman

**IV/Catheter Improvement**  
*Sponsor: KU Innovation and Collaboration*  
Industrial Liaison: Stephen Waller, MD  
Instructor: Ron Dougherty  
Advisor: Ted Bergman  
Student Team: Saud Alenezi, Feng Chen, Shanshan Huang, Joshua Johnson
Industry-Sponsored Capstone Projects

**Micro-Grid Research**  
**Sponsor:** Black & Veatch  
Industrial Liaison: Scott Stallard  
Instructor: Tom DeAgostino  
Advisor: Chris Depcik  
Student Team: Mason Proctor, Bryton Stoll, Ben Taliaferro

**Multi-Shuttle System Buffer Faults and Rate Improvement**  
**Sponsor:** Frito-Lay North America (Pepsico)  
Industrial Liaison: Allen Moore  
Instructor: Tom DeAgostino  
Advisor: Tricia Bergman  
Student Team: Dalvir Parmar, Daniel Pericich, Shawn Reggeti

**Packaging Machine Fault and Rate Improvement**  
**Sponsor:** Frito-Lay North America (Pepsico)  
Industrial Liaison: Allen Moore  
Instructor: Tom DeAgostino  
Advisor: Lorin Maletsky  
Student Team: Jenelle Huffman, Alexie De Los Santos, Edmund Post

**Palletizing System Optimization**  
**Sponsor:** Frito-Lay North America (Pepsico)  
Industrial Liaison: Allen Moore  
Instructor: Tom DeAgostino  
Advisor: Patricia Bergman  
Student Team: Yifan Chen, Phillip Knopp, Nathan Marlow, Matt Rush

**Peanut Uniformity and Waste Reduction Optimization**  
**Sponsor:** Mars Chocolate North America  
Industrial Liaison: Randi Stahl  
Instructor: Tom DeAgostino  
Advisor: Xianglei Li  
Student Team: Jose Alvarado, Jeff Healy, Omar Prieto

**Percutaneous Ablation System for Atrial Fibrillation**  
**Sponsor:** Medika  
Industrial Liaison: Roy Chin  
Instructor: Tom DeAgostino  
Advisors: Geng Ku and Tom DeAgostino  
Student Team: Ray Martinez, Amber Morgan, Patrick Nacht- sheim, Alexandra Schoenberg

**Plastic Surgery Device**  
**Sponsor:** M. H. Moser, M.D.  
Industrial Liaison: Matt Rhea  
Instructor: Tom DeAgostino  
Advisor: Sara Wilson  
Student Team: Hayley Disney, Alex North, Joseph Rumbaugh, Angela Tsang

**Pressure Regulator Stability Analysis**  
**Sponsor:** Nidek Medical  
Industrial Liaison: Len Suelter  
Instructor: Tom DeAgostino  
Advisor: Carl Luchies  
Student Team: Sean Racksiki, Helena Salt, Christopher Snow

**Renal Denervation Hypertension System**  
**Sponsor:** Medika  
Industrial Liaison: Roy Chin  
Instructor: Tom DeAgostino  
Advisor: Geng Ku and Tom DeAgostino  
Student Team: Gretchen Baker, Glenn Karnes, Jennifer Morgan, Nicole Speckin

**Rib Rod Connector Design**  
**Sponsor:** Children's Mercy Hospital  
Industrial Liaison: Richard Schwend, M.D.  
Instructor: Ron Dougherty  
Advisor: Ken Fischer  
Student Team: Jonathan Deckert, Wenbin Dong, Jessica Robin, Matt Rush

**RID Kit Process Improvement**  
**Sponsor:** Bayer Healthcare Animal Health  
Industrial Liaison: John Caldwell  
Instructor: Tom DeAgostino  
Advisor: Lin Liu and Tom DeAgostino  
Student Team: Blaise Kehr, Chase Low, Zach Maeser, Samuel Ross, Colin Toalson

**R&D of Energy Efficiency via Clean Energy and Conservation**  
**Sponsor:** HEMCO  
Industrial Liaison: David Campbell  
Instructor: Tom DeAgostino  
Advisor: Xinmai Yang  
Student Team: Dedan McEllhiney, Nathan Reilly, Taylor Wright
Industry-Sponsored Capstone Projects

Site Engineering Improvements
Sponsor: Bayer Healthcare Animal Health
Industrial Liaison: Prasad Saraph
Instructor: Tom DeAgostino
Advisor: Ted Bergman
Student Team: Daiane Aizen, Enrico Gosselaar, Rakesh Prasad, Adam Sheridan

Small-Scale Smart Grid
Sponsor: Westar Energy
Instructor: Chris Depcik
Advisor: Chris Depcik
Student Team: Drew Humphreys, Daniel Muccinco, Dillon Shupe, Myette Simpson

Smart Grid Research
Sponsor: Black & Veatch
Instructor: Tom DeAgostino
Advisor: Chris Depcik
Student Team: Andrew Craig, Xiaokuan Li, Alex McInerny, Patrick Sesker

Spiral Filter
Sponsor: Clarcor
Instructor: Tom DeAgostino
Advisor: Gibum Kwon
Student Team: Seth Miller, Baher Moghaddam, Alexander Pruss

Syringe Shield Pull-Off Force Teams 1 & 2
Sponsor: BD Medical
Instructor: Ron Dougherty
Advisor: Ron Dougherty
Student Team: Jeremiah Karczewski, Cedric Leimkuehler, Krystina Pingel, Kevin Sitek, Karli Somers

Tensile Strength Efficiency of Potted Terminations for Synthetic Fiber Ropes
Sponsor: WireCo WorldGroup
Instructor: Tom DeAgostino
Advisor: Geng Ku
Student Team: Saleh Abbadi, Abbas Alsahaf, Hugh Woodworth

Testing System for Cooling Towers Fill Materials/Design
Sponsor: SPX Cooling Technologies
Industrial Liaison: Jidong Yang
Instructor: Ron Dougherty
Advisor: Ron Dougherty
Student Team: Tyler Leow, Tabitha Teo, Javier Vizcara

UAV Airframe
Sponsor: Aerotenna, LLC
Industrial Liaison: Bruno Camps and Zongbo Wang
Instructor: Tom DeAgostino
Advisor: Robb Sorem
Student Team: Eric Nevins, Josh Shope, Ian Thompson

Water Use and Reclamation at Kroger/Dillons
Sponsor: Henderson Engineers, Inc.
Industrial Liaison: Ryan Evans
Instructor: Tom DeAgostino
Advisor: Sarah Kieweg
Student Team: Blake Hampton, Jon Gepner, Austin Perry, Cody Powell
Sponsors

Research

Army Research Office
DePuy Synthes Joint Reconstruction
Institute for Advancing Medical Innovation
Kansas Soybean Commission
Kauffman Foundation
National Institutes of Health
National Science Foundation
Nuclear Regulatory Commission
TUBITAK
University of Kansas Ophthalmology Department

Capstone Design

National Science Foundation
Aerotenna, LLC
Altec
Bayer Healthcare Animal Health
BD Medical
Black & Veatch
Build Smart
Children's Mercy Hospital
Clarcor
Frito-Lay North America (Pepsico)
Hallmark Cards
HEMCO
Henderson Engineers, Inc.
HCI Energy
Honda R&D Americas
John Zink Hamworthy
KU Innovation and Collaboration
Mars Chocolate North America
Medika
M.H. Moser, M.D.
Nidek Medical
Oread Medical
SPX Cooling Technologies
Westar Energy
WireCo WorldGroup
Photo Credits
Front and back cover: Flickr.com
Page 11: R.Steve Dick, KU Marketing Communications
Page 21: KU Marketing Communications
Page 29: R.Steve Dick, KU Marketing Communications

Report Production: Kate Maisch

Nondiscrimination statement
The University of Kansas prohibits discrimination on the basis of race, color, ethnicity, religion, sex, national origin, age, ancestry, disability, status as a veteran, sexual orientation, marital status, parental status, gender identity, gender expression and genetic information in the University’s programs and activities. The following person has been designated to handle inquiries regarding the nondiscrimination policies: Director of the Office of Institutional Opportunity and Access, IOA@ku.edu, 1246 W. Campus Road, Room 153A, Lawrence, KS 66045, (785) 864-6414, 711 TTY.
On the Cover:

Moses (10 foot tall, 1.5 ton bronze by Elden Teftt, 1982) and the Burning Bush (stained glass, approximately 20 feet by 30 feet, by Charles Marshall, 1982). The University of Kansas.

Moses represents the humble scholar who kneels before the flame, a symbol of knowledge. Moses and the burning bush adorn the official seal of the University of Kansas.