

## Graduate Study in Mechanical Engineering

The University of  
**KANSAS**



*The University of Kansas Department of Mechanical Engineering offers the Master of Science, Doctor of Philosophy, and Doctor of Engineering degrees. Professors and graduate students actively investigate a variety of cutting-edge research areas. The department receives research funding from industry, the National Science Foundation, the National Institutes of Health, and private foundations.*

### Research Activities

- Biomechanics and Biomaterials
- Computational Mechanics and Mathematics of Computations
- Thermal-Fluid Systems and Heat Transfer
- Mechanical Design, Manufacturing, and Microprocessor Applications

### Master of Science Degree

Students who have accredited baccalaureate degrees in mechanical engineering, or who have good preparation in another engineering discipline or a related field such as physics, are encouraged to apply for admission to the

M.S. program. For admission to regular status, the student must have an undergraduate grade-point average of at least a B (3.0 on a 4.0 scale). Students whose undergraduate grade-point averages are no lower than 2.75 on a 4.0 scale are considered for admission to probational status on a case-by-case basis.

The Department of Mechanical Engineering offers a thesis option and a nonthesis option leading to the M.S. degree. The thesis option requires a minimum of 30 credit hours of graduate work, including a thesis for 6 hours of credit. The nonthesis option requires a minimum of 30 credit hours of graduate course work, which may include a 3-credit-hour independent investigation. A thesis-option student is expected to perform original research work that would be the basis of a paper suitable for publication in a refereed journal. Each M.S. degree candidate must pass a final examination, which may be oral or both written and oral as determined by the advisory committee.



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### Doctor of Philosophy Degree

The Ph.D. program prepares students to become independent researchers. It requires course work, research, a dissertation, a doctoral qualifying examination, and a final oral examination. A minimum grade-point average of 3.5 on a 4.0 scale in master's degree work normally is required for admission to the doctoral program.

To complete requirements for the Ph.D., students must spend a minimum of three full academic years, or the equivalent, beyond the baccalaureate degree in graduate study at KU or some other approved university, including the time spent in attaining the master's degree. A total of 84 credit hours beyond the bachelor's degree is required for a Ph.D. For students with a 30-hour master's degree in mechanical engineering, an additional 24 hours of course work and a 30-hour dissertation are required. If a master's degree is not sought, 48 hours of course work beyond the bachelor's degree and a 36-hour dissertation are required. The Ph.D. dissertation presents the results of the student's research investigation. It is expected to make an original contribution to technical knowledge of sufficient quality to merit publication in refereed journals.

### Doctor of Engineering (D.E.) Degree

Unlike the Ph.D., which is a research degree, the D.E. is oriented toward industrial and professional practice. The D.E. degree is granted on completion of at least 90 credit hours of post-baccalaureate work. Each stu-

dent normally spends at least 12 consecutive months of internship in industry or government. The internship involves the student at a level that promotes experience in project management. Students also must pass a qualifying examination and a final oral exam.

### Financial Aid

Various types of financial aid are available, including teaching and research assistantships and graduate fellowships. A few fellowships with stipends plus fees are available for particularly outstanding students. Applications for fellowships or research assistantships should be submitted to the Department of Mechanical Engineering at least six months before the academic year for which the scholarship or research assistantship is desired.

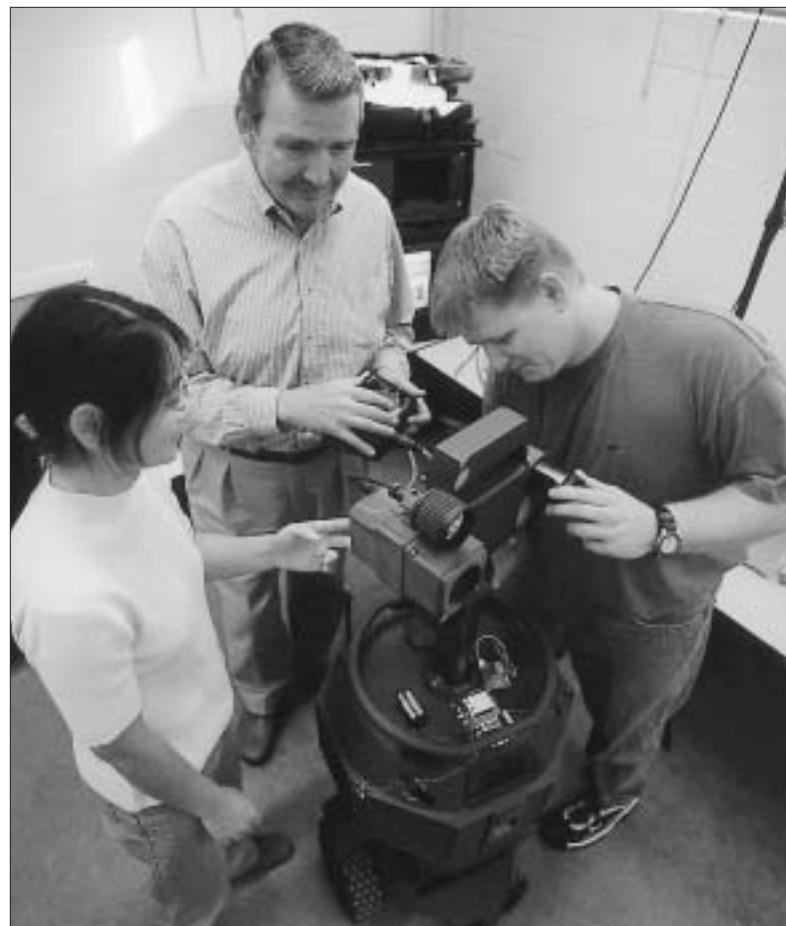
### Inquiries and Applications

Address inquiries and applications for admission and financial aid to

**The University of Kansas  
Department of Mechanical  
Engineering  
Graduate Studies, Learned Hall  
1530 West 15th St., Room 3138  
Lawrence, KS 66045-7609**

Telephone: (785) 864-3181  
E-mail: [kume@ku.edu](mailto:kume@ku.edu)  
Web site: [www.engr.ku.edu/me](http://www.engr.ku.edu/me)  
Online Graduate School application:  
[www.graduate.ku.edu](http://www.graduate.ku.edu)

Applications for admission must accompany all requests for financial aid. All applications must be accompanied by a nonrefundable fee payable to KU. See [www.graduate.ku.edu/Admissions](http://www.graduate.ku.edu/Admissions) for current application fee rates.

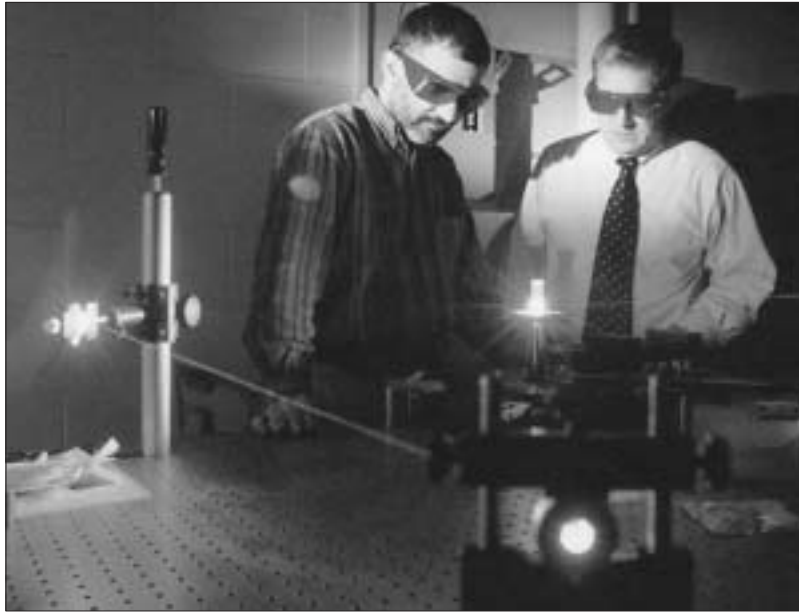


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# MECHANICAL ENGINEERING

The University of Kansas



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## Graduate Courses

### Biomechanics and Biomaterials

- ME 633 Basic Biomechanics
- ME 750 Biomechanics of Human Motion
- ME 751 Experimental Methods in Biomechanics
- ME 753 Bone Biomechanics
- ME 754 Continuum Mechanics for Soft Tissues
- ME 757 Biomechanical Systems
- ME 765 Biomaterials

### Computational Mechanics and Mathematics of Computations

- ME 701 The Finite Element Method for Stress Analysis
- ME 702 Mechanical Engineering Analysis
- ME 761 Theory of the Finite Element Method
- ME 862 Finite Element Method for Transient Analysis
- ME 961 Finite Element Method for Nonlinear Problems in Solid Mechanics
- ME 962 p-Approximation, Error Estimation, and Other Advanced Topics in the Finite Element Method
- ME 963 Finite Element Method in Fluid Dynamics
- ME 964 Advanced Topics in Finite Element Method for Fluid Dynamics

### Thermal-Fluid Systems and Heat Transfer

- ME 636 Internal Combustion Engines
- ME 637 Steam Power Plants
- ME 656 Thermal System Design
- ME 710 Advanced Fluid Mechanics
- ME 711 Bearings and Bearing Lubrication
- ME 712 Advanced Engineering Thermodynamics
- ME 731 Convective Heat and Momentum Transfer
- ME 732 Computational Fluid Mechanics and Heat Transfer
- ME 733 Gas Dynamics
- ME 770 Conductive Heat Transfer
- ME 774 Radiative Heat Transfer

### Mechanical Design, Manufacturing, and Microprocessor Applications

- ME 627 Automotive Design
- ME 696 Design for Manufacturability
- ME 708 Microcomputer Applications in Mechanical Engineering
- ME 720 Advanced Dynamics of Machinery
- ME 740 Mechanical Vibrations
- ME 763 Introduction to Composite Materials
- ME 780 Kinematic Synthesis of Mechanisms
- ME 796 System Design and Analysis
- ME 798 Advanced Microprocessor Applications
- ME 863 Mechanics of Composite Materials

## Faculty

The mechanical engineering faculty combines diverse backgrounds and interests to provide intensive and rewarding graduate study for students.

**Stuart R. Bell**, professor and dean (Ph.D., Texas A&M); alternative fuels for internal combustion engines, modeling of engine and engine processes, innovative engine design, and fundamental and applied combustion topics.



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**Louis C. Burmeister**, professor (Ph.D., Purdue); solar energy, heat transfer, thermal-fluid sciences. Current research projects include spiral plate exchange analysis with CFD, design of a concentrated solar collector with piezoelectric elements for shape control, and Monte Carlo methods for diffusion-like problems.

**Ronald L. Dougherty**, PE., professor and chair (Ph.D., Missouri-Rolla); radiative heat transfer, two-phase heat transfer, thermal fluid sciences, laser scattering, dynamic light scattering, thermodynamics. Current research employs dynamic and static light scattering to characterize micro- and nano-sized particles in fluid suspensions.

**Terry N. Faddis**, professor (D.E., Kansas); mechanical design, computer-integrated manufacturing, augmented telerobotics. Recent research efforts include the application of microprocessors and sensors to advanced electromechanical systems.

**Ken J. Fischer**, assistant professor (Ph.D., Stanford); biomechanics of joints, tissues, and biomaterials; computational mechanics. Current focus is on modeling contact pressures in living subjects based on Magnetic Resonance Images. This technique will be used to study ergonomics, degenerative joint diseases, and surgical reconstructions.

**Elizabeth A. Friis**, assistant professor (Ph.D., Wichita State); biomechanics, composite materials, biomaterials, biomedical product design and testing. Dr. Friis is active in the development of a mechanical analog lumbar spine, assessment of bio-

medical materials, and biomedical device design and testing.

**Carl W. Luchies**, associate professor (Ph.D., Michigan); biomechanics, measurements, experimentation, dynamics. Dr. Luchies investigates the effects of age, age-related disease, and exercise on balance and motor control and regularly collaborates with faculty in physical therapy, occupational therapy, geriatrics, exercise science, cognitive physiology, mathematics, and engineering.

**Lorin P. Maletsky**, assistant professor (Ph.D., Purdue); biomechanics, knee mechanics, machine design. Research efforts include dynamic simulation of the knee to evaluate prosthetic performance, joint mechanics, and function and injury of ligaments and soft tissues of the knee.

**Robert M. Sorem**, associate professor and associate dean (Ph.D., Kansas); computational mechanics, composite materials, mechanical design, finite element methods. Recent efforts include direction of the Formula SAE team, all-composite chassis design, and research on the effect of environmental degradation on material properties for honeycomb core material.

**Karan S. Surana**, Deane E. Ackers Distinguished Professor (Ph.D., Wisconsin); mathematics of computations, computational mechanics, finite element methods, error estimation, adaptive processes, software engineering. Linear and non-linear solid mechanics including linear elastic and elastoplastic fracture mechanics, composite mechanics, fluid dynamics, incompress-

ible flows, gas dynamics, polymer flows and fluid-structure interactions.

**Peter W. TenPas**, associate professor (Ph.D., Iowa State); computational fluid dynamics, computational aeroacoustics. Dr. TenPas is developing high-accuracy numerical methods for fluid dynamics and gas dynamics problems. These techniques will enable engineers to accurately predict complex fluid motions, and ultimately to design quieter and more efficient machinery.

**Robert C. Umholtz**, PE., associate professor (M.S., Kansas); kinematics, dynamics of machinery, vibrations.

**Sara E. Wilson**, assistant professor (Ph.D., M.I.T.); biomechanical systems, motion and muscle mechanics, occupational vibration, research ethics. Dr. Wilson focuses on understanding trunk and spine motion and control in order to address the prevention and treatment of age-related vertebral fractures, scoliosis, and low back pain.

**Bedru Yimer**, professor (Ph.D., Dayton); heat transfer, thermal system design, fluid mechanics, thermodynamics. Dr. Yimer's continuing research interest involves the analysis, development, design, and optimization of phase change energy storage systems, particularly for space applications such as heating and cooling and overall energy management of spacecraft and space stations.

## The University

The University of Kansas is a major educational and research institution with 29,000 students and 2,100 faculty members. KU includes the main campus in Lawrence; the Medical Center in Kansas City, Kansas; the KU Edwards Campus in Overland Park; a clinical campus of the School of Medicine in Wichita; and educational and research facilities throughout the state. KU has 14 major academic divisions: the College of Liberal Arts and Sciences, the Graduate School, and the Schools of Allied Health, Architecture and Urban Design, Business, Education, Engineering, Fine Arts, Journalism and Mass Communications, Law, Medicine, Nursing, Pharmacy, and Social Welfare. Visit KU's Web site, [www.ku.edu](http://www.ku.edu).

Research is an integral part of the university's educational process. KU has more than 40 special research facilities, in addition to those in individual departments and schools. KU set a record of \$258 million for total research expenditures in 2003. The National Science Foundation classifies KU as a major university receiving substantial research support. The Carnegie Foundation classifies KU as a research-extensive doctoral institution, a classification given to the top research universities.

The university belongs to the American Association of Universities, a select group of higher education institutions in the United States and Canada. Members are chosen on the basis of national significance in graduate studies and research. In 2003-04, the university awarded 257 doctoral degrees in 60 academic areas.

The University of Kansas prohibits discrimination on the basis of race, color, religion, sex, national origin, age, ancestry, disability, veteran status, sexual orientation, marital status, and parental status.

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