



Ernest R. Lehman

ERNEST S. KUH

1928–2015

Elected in 1975

“Contributions to circuit and system theory.”

BY DANIEL McGLYNN
SUBMITTED BY THE NAE HOME SECRETARY

ERNEST SHIU-JEN KUH, dean and professor emeritus at the University of California–Berkeley College of Engineering and an internationally renowned expert in electronic circuit theory, died June 27, 2015. He was 86.

He joined the Berkeley faculty in 1956 and made pioneering contributions in active and passive circuit theory, electronic design automation of integrated circuits, and engineering education. He was chair of the Department of Electrical Engineering and Computer Sciences from 1968 to 1972 and then dean of the College of Engineering from 1973 to 1980.

“Ernest Kuh was instrumental in establishing the College of Engineering as a world leader in research, teaching, and public service,” said S. Shankar Sastry, dean and Carlson Professor of Engineering at Berkeley. “He set exacting standards of excellence in everything he did, and he was extraordinarily devoted to the well-being of the Berkeley engineering community. His legacy will shape our influence and impact for years to come.”

Ernest Shiu-Jen Kuh was born October 2, 1928, in Beijing. His father worked as a government official and then in private business. With the political instability in the region prior

Adapted from a tribute published by the College of Engineering, University of California, Berkeley, July 8, 2015.

to World War II, the family moved frequently, eventually to Shanghai in 1937. In 1947 Kuh left China, on a slow ocean freighter carrying other students, to continue his education in the United States.

He began studying electrical engineering at the University of Michigan in the winter of 1948. He endeavored to improve his English by taking a literature course, which he found more challenging than his mathematics and physics courses. He received his BS in 1949 and the next year, at MIT, his master's degree, both in electrical engineering. At MIT he met circuit theorist Charles Desoer and the two later worked together and were frequent collaborators.

In 1950 Kuh started a PhD program at Stanford, pursuing research in network theory. He completed his degree in 1952, after just six quarters, and saw his thesis published in the *Journal of Applied Physics*, a rare place to find student work, especially in electrical engineering.

He promptly went to work for Bell Laboratories in Murray Hill, New Jersey. It was the only place he applied for a job, and he was the second Chinese employee there. He worked in the transmission development division on issues related to telephone infrastructure, specifically transmission repeater designs and submarine cable design. His work was incorporated in the first transatlantic telephone cable, laid in 1956.

Desoer joined Bell Labs the year after Kuh was hired. They would meet after work in a study group with other Bell Lab colleagues, discussing new ways to write the differential equations that form the mathematical basis of electronic circuit function. Kuh later recalled that, "In my career, Desoer was responsible for my research, and [Donald] Pederson was responsible for my teaching."

Shortly after moving to Berkeley, Kuh met Bettine Chow at a party. They married in 1957. Son Anthony was born in 1958, followed by Theodore in 1960.

Kuh took his first sabbatical from Berkeley in 1962, and held six-month appointments first at Imperial College London and then at the Technical University of Denmark.

By 1966 he was completing what became a widely used book, *Basic Circuit Theory* (McGraw-Hill), with Desoer (who had also joined the Berkeley faculty), and was asked to head the Electrical Engineering Department, which had recently integrated computer science.

In 1968 he was appointed chair of the Department of Electrical Engineering and Computer Sciences. The department explored new domains of research under Kuh's leadership, including bioelectronics, which laid the foundation for the future bioengineering department. Kuh credits his predecessor as department chair, Lotfi Zadeh, as a valuable mentor throughout his career.

Engineering professor and dean emeritus David Hodges first met Kuh as a Berkeley graduate student and then became his faculty colleague in the EECS department, recruited by Kuh himself. "Ernie Kuh was the best classroom teacher I ever had," said Hodges. "His lectures were superbly well organized, with clear presentation of fundamental principles and examples of their application in design. His textbooks have the same qualities of organization and clarity. In the 1960s, he was one of the first to apply digital computing methods to circuit design."

As department chair, Kuh began reaching out to companies and research organizations such as Bell Labs, GE, and IBM to develop relationships. He held industrial liaison meetings, establishing a model that would be replicated elsewhere at the university and beyond.

He was asked to be the college's dean in 1973. He quickly established an assistant dean in charge of interdisciplinary studies, recognizing (this was during the energy crisis) that collaboration was key to finding solutions to big problems. He also wanted to establish a larger engineering library, which at the time was in cramped quarters on O'Brien Hall's fourth floor.

He spent years developing relationships and raising funds for what would eventually become the Bechtel Engineering Center, complete with a new library. The center "was the

realization of Ernie's dream, a monument to his extraordinary administrative skill and hard work," recalled EECS professor emeritus Edwin Lewis. "I shall miss Ernie's intensely serious approach to all matters intellectual."

Out of the fundraising efforts, Kuh realized that, in order to grow, the College of Engineering would need stable funding, so he formalized the Berkeley Engineering Fund and expanded the industrial liaison program he had started as EECS department chair.

"Professor Kuh possessed many of the qualities of a natural leader: a selfless dedication to duty, a nobility of purpose, flawless execution, and an ability to inspire people of all walks and all ages," said EECS professor emeritus Eugene Wong. "He brought together these qualities as an extraordinary dean of the college. He will be remembered with great respect and affection for his wise counsel and unstinting support by all those whose lives he touched."

In 1973, for the first time since he left in 1947, Kuh returned to mainland China with his family as part of a delegation of professors from Berkeley. The month-long trip was hosted by the Chinese Academy of Sciences. He visited China many more times after that. It was the beginning of over 40 years of collaboration and consultation with Chinese universities on improving engineering education throughout China.

While on sabbatical in Japan in 1977–78, he took up the emerging field of electronic design automation (EDA), which became a second, more applied, research interest. In 1980 he decided to step down from the dean's position to focus more time on EDA research questions. His work laid the intellectual foundations for computer-aided design (CAD) and computer-aided manufacturing (CAM), which had numerous academic and industrial uses.

"Since the mid-1970s, Professor Kuh has been one of the key founding fathers of the EDA industry," said Chi-Ping Hsu, who studied with Kuh and is now senior vice president and chief strategy officer of Cadence Design Systems. "In addition to his numerous research and technology breakthroughs in the most challenging EDA domains for several decades, his

contributions went far beyond the technology front. Many of the early EDA companies were formed by his students and fellow researchers. His vision and guidance helped expedite the formation and maturity of the EDA industry, with over 30 years of continuous semiconductor advancements in all segments of the electronics industry.”

During his academic career, Kuh worked to recruit and retain more women and people of color in the engineering program, and mentored several generations of graduate students. In total he supervised 40 PhD students, who today occupy leadership positions in academia and industry.

“From advising my PhD studies to serving as a board member of my startup company, Professor Kuh has been my lifelong mentor and role model,” said Wayne Dai, who became a professor at UC Santa Cruz and then founded VeriSilicon, headquartered in China. “His great vision of the ‘big picture,’ his brilliant mind driven by passion and persistence, and his deeply caring spirit that never faltered in generosity will be remembered fondly by all of us.”

Ronald Rohrer, professor emeritus at Carnegie Mellon University, also studied under Kuh. “The world of electrical and computer engineering knew Ernest Kuh as a gifted researcher, teacher, and administrator,” said Rohrer. “Those lucky to be his graduate students knew Ernie better, as someone who provided great ideas to Berkeley and shared them generously. He provided mentoring and momentum that launched so many successful careers.”

In 1992 Kuh became a professor emeritus, but continued to maintain an active schedule. He served on Berkeley’s budget committee and advised other engineering schools. He and Bettine endowed the Ernest S. Kuh Distinguished Lecture Series to bring notable scientists and engineers to campus.

In addition to his duties at Berkeley, he was a sought-after advisor and consultant, serving in varying capacities for numerous companies and organizations throughout his career. Most notably, he held leadership positions on committees for the Institute of Electrical and Electronics Engineers (IEEE), National Research Council, National Institute of Standards

and Technology, and National Science Foundation Advisory Committee.

“Ernie continued to be engaged with our faculty long after his retirement,” said Tsu-Jae King Liu, dean of UC Berkeley’s College of Engineering and Roy W. Carlson Professor of Engineering. “I am fortunate and very grateful to have had the benefit of his advice and support through many years.”

Kuh was elected to the National Academy of Engineering in 1975. He received honorary doctorate degrees from Hong Kong University of Science and Technology in 1997 and National Chiao Tung University in Taiwan in 1999. In addition, he was named an honorary professor at six universities in China.

He authored or coauthored six textbooks and several hundred research papers, and delivered countless technical talks and presentations. At the time of his retirement from the Berkeley faculty, he held the William S. Floyd Jr. Distinguished Chair.

His impact on engineering education and the field of electrical engineering was recognized through numerous awards, including the 1996 C&C Prize of the Japan Society for Promotion of Communication and Computers, the 1998 Phil Kaufman Award given by the Electronic Design Automation Consortium, and the IEEE Centennial and Millennium Medals.

The Kuhs were patrons of classical music and opera. They also enjoyed traveling and exploring the world. He liked to read, particularly books about China and biographies of prominent people, and was an avid sportsman, playing tennis and swimming. Theodore recalls, “My father also thoroughly enjoyed Cal athletics, particularly the football games, which he attended with his family and friends over many decades.”

Kuh is survived by his wife of 58 years, Bettine; Anthony and Theodore; and grandsons Matthew, Jason, and Evan.

