

Memorial Resolution for Robert Edwin Zink

Robert E. (Bob) Zink joined the Purdue faculty in 1953 upon receiving his PhD from the University of Minnesota, and remained in West Lafayette and Purdue until he passed away July 30, 2020. Bob was native of Minnesota, and attended the University of Minnesota as both undergraduate and graduate, with Bernard Gelbaum as thesis supervisor. While at Minnesota, the strength of his academic accomplishments were recognized by membership in the honorary societies Phi Beta Kappa and Sigma Xi.

He came to Purdue the following fall, and other than a couple of sabbaticals and military service in Washington, DC in 1955-56, remained on our faculty until his 1998 retirement. He was Assistant Department Head in 1965-69 and Assistant Dean of the Graduate School in 1969-72. Even his “retirement” was only in a technical sense, since he maintained his office and teaching (usually pro bono) until as recently as December 2017. His post-retirement work centered on the undergraduate honors mathematics sequence.

Bob was devoted to and immensely popular with students. He regularly served in the university’s Faculty Fellow program, for which he was recognized in 1985 by the university-wide Fredrick L. Hovde award. Ten years later his overall work with students led to him receiving the Charles Murphy Excellence in Undergraduate Teaching Award, Purdue’s highest honor for undergraduate teaching, and his name is permanently enrolled in the Purdue Book of Great Teachers.

Bob’s thesis was in real analysis (Direct Unions of Measure Spaces), which remained the focus of his research activity. At the time of his hiring, Lamberto Cesari was Purdue’s most prominent analyst, but Cesari soon left, and during the next several years, Bob was joined by Caspar Goffman, J.J. Price, Richard Darst, and Harry Pollard, together making Purdue a national center of activity in classical real analysis. This in turn was foundational during the next decade as the department took advantage of a national effort to increase the US profile in science during the Cold War to raise its research impact and become a vigorous center of mathematical research.

Real analysis in those days was influenced by formalizations and generalizations of notions whose origins lay in Fourier analysis, but which today are more commonly introduced in linear algebra or functional analysis courses. While linear algebra deals with finite sums, analysis involves infinite sums, and there are many ways to interpret a representation of an object as an infinite sum. Bob’s most cited work (developed at Purdue with Price, continued several decades later with K. Kazarian) centered on systems of functions $\Phi = \{\varphi_n\}$ being *total in measure* on a measure space X . This means that any measurable function f on X can be represented as the limit, at almost all points of X , of finite linear combinations of elements of Φ . Bob and Price made connections with work of Soviet authors, and wrote a well-known and cited paper in the *Annals of Mathematics* (1965) which showed that being total in measure was equivalent to (in terms introduced earlier by Boas and Pollard) being *multiplicatively complete*. Thus, there exists a fixed function $m(x) \geq 0$ associated to Φ so that any L_2 -function on X may be written as a convergent infinite sum of functions from the system $\{m(x)\varphi_n(x)\}$. Bob’s six PhD students made additional contributions to the subject.

Outside the department, Bob had a vigorous presence in community activities, notably performing in university and community theatrical and musical groups. (One of us enjoyed accompanying him when as part of a vocal recital, he sang the famous Mephistopheles aria from Gounod's Faust.) He was a long-standing member of the Bach Chorale. His tall frame and deep voice made him easily noticed. In 1988, the Tippecanoe Arts Foundation honored Bob with the Suzanne Stafford Memorial Award.

Since Purdue has the nation's oldest university-owned airport, Bob was able to indulge another interest to become a credentialed pilot. Bob received his private pilot license in 1967, and later obtained an Airline Transport Pilot certificate, leading him to become a flight instructor and thus provide new venues for his teaching. He enjoyed transporting students, colleagues, friends, and local business figures for many years, as well as piloting some charter flights.

He also was a regular at the golf course, a pastime dating from his Minnesota days, and served as president of the Greater Lafayette Golf Association

He and his wife Gloria were long-standing members of the First United Methodist Church. Gloria passed away eight years ago. They are survived by their three sons, four grandchildren and their families.

To honor his memory and help continue the main focus of his teaching, the Robert E. Zink Fund was established through the Purdue Research Foundation. Its funds will be used to support our undergraduate mathematics programs and students.

Rodrigo Bañuelos

David Drasin

László Lempert

Leonard Lipshitz, November 2020