



## Theodore A. Burton (1935–2025)

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Outstanding researcher, author, and educator of differential equations, Theodore A. Burton passed away on January 5, 2025, in his 90th year.

“Ted”, as he was known to many, was a renowned personage of the community of differential equation people. He worked in the theory of ordinary, functional, partial differential equations, integral equations, and fractional differential equations. He enriched several branches of these fields, especially those of stability, periodicity, and oscillations, with fundamental achievements. He published more than 220 scientific papers in mathematical journals devoted to research in the theory of ordinary, integral, functional and fractional differential equations. He is the author of five monographs and also the editor of two books on mathematical biology. According to Mathematical Reviews, his works have been cited more than 2000 times by other leading authors and researchers, Google Scholar gives more than 9000 citations.

Born on September 7, 1935 in Longton, Kansas, USA, Theodore Allen Burton completed his elementary and high school in the Cascade Mountains of the state of Washington. In 1959, he graduated from Washington State College with a Bachelor of Science with Honors. On August 5, 1961, he married Fredda Jean Anderson.

At Washington State University, Ted earned both a Master’s degree (1962) and his Ph.D. (1964), the latter under the direction of Professor Donald W. Bushaw. After completing his Ph.D., Ted accepted an academic position at the University of Alberta in Edmonton, Canada, where he worked for two years. In 1966, he joined the faculty of Southern Illinois University at Carbondale (SIUC) as an Associate Professor of Mathematics, and quickly contributed to the development of the doctoral program in Mathematics as led by J. M. H. Olmsted. Often referred to as the “Bear”, perhaps because his wife, Fredda, called him “Mister Bear” and because of his features at the time (a bit rotund and a bushy beard). Ted attracted students to his research interests in differential equations early on. In fact, his first three Ph.D. students, all named John, were among the first to receive Ph.D.s in Mathematics from SIUC; there were only two earlier graduates of the program.

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According to Ted's own assertion, one of his primary achievements in academia that gave him the most pleasure was his success at mentoring doctoral students. In all, he supervised thirteen young mathematicians who earned Ph.D.s in mathematics, each of whom enjoyed a successful career of their own as university professors. In addition to these thirteen students, the Mathematics Genealogy Project lists nine other Mathematical descendants of Ted. Speaking of descendants, Bushaw was a student of Solomon Lefschetz, not a bad lineage for Ted's students.

In 1998, Ted retired from teaching at SIUC and was immediately named Emeritus Professor. He relocated to the state of Washington and founded the Northwest Research Institute, where he continued doing research. He remained active as a plenary speaker at multiple international conferences.

Ted's activity in teaching and research was international in scope. Twice he was awarded a Fulbright senior scholarship to Eastern Europe, once at the University of Szeged and later at the Technical University of Budapest. He also held research appointments at the University of Florence and the University of Madrid. He lectured at more than eighty conferences around the world. He served on the editorial boards of multiple international mathematics journals.

He was one of the founding Editors-in-Chief (along with László Hatvani of the University of Szeged, Hungary) of the *Electronic Journal of Qualitative Theory of Differential Equations (EJQTDE)*, the first volume of which appeared in 1998. Ted was of the opinion that mathematical journals were too expensive, and as a consequence, some mathematical institutes were not able to ensure that new scientific information was readily available to their researchers. He wanted to start a new mathematical journal that would be free to anyone wishing to see its contents. Thus, the EJQTDE was born.

Ted loved the EJQTDE. He once said that, as one of the Editors-in-Chief, he read every paper before it appeared to ensure that there was nothing written that might make the Journal liable in any way. The editorial leadership of EJQTDE has since transitioned to Jeff Webb in 2012 and Tibor Krisztin in 2015. True to Ted's own standards with respect to scholarly publication, EJQTDE is a diamond open-access journal, meaning that no charges and fees to either the reader or the author. Today, according to several academic journal rankings, EJQTDE is a high quality journal in the field of differential equations.

Ted's own research embraced several different aspects of differential equations. During his doctoral years he studied the Liénard equation, a natural nonlinear generalization of the damped linear oscillator equation. Of primary interest, he showed that solutions of the nonlinear equation share properties similar to those of solutions to the linear oscillator equation.

Ted had a lifelong interest in stability theory and in Lyapunov's second (direct) method in particular. He felt that his most interesting contributions were in the construction of some explicit Lyapunov functions and functionals. It is clear that he contributed significantly to the theoretical foundations of Lyapunov theory and furthered the development of the direct method as well. Some of his early work was on the boundedness and stability of solutions of second-order nonlinear equations. This included his work on the Liénard equation and other results on the oscillation of nonlinear equations. He was an advocate of applying the Krasnosel'skii fixed point theorem for a mapping that is a sum of a compact map and a contraction map. In the last few years of his life, Ted became especially interested in various aspects of fractional differential equations.

The Bear loved mathematics and passed that love on to his students. His influence on them was profound; he was their mentor, their friend, and their colleague all at once.