

In Memoriam
David M. Himmelblau, 1924-2011
By Tom Edgar

The chemical engineering community lost one of its greatest when David M. Himmelblau, Ph.D., passed away at the age of 87 on Wednesday, April 27, 2011. Known for his integrity, sincerity, intelligence, and distinctive wit, David was an inspiration to students for 42 years as a professor at The University of Texas at Austin. At the time of his death he was the Paul D. and Betty Robertson Meek and American Petrofina Foundation Centennial Professor Emeritus in Chemical Engineering. A pioneer in process fault detection and diagnosis, the author of 11 books and over 200 articles on process analysis, process optimization, and fault detection using artificial neural networks, Dr. Himmelblau had a significant impact on the chemical engineering profession.

David M. Himmelblau was born in Chicago, IL, the son of David and Rhoda Mautner Himmelblau. In 1947, he earned his B.S. in chemical engineering from the Massachusetts Institute of Technology, after serving as an intelligence officer in the U.S. Army during World War II. The following year, he married Betty Hartman, whom he first met in elementary school. Over the next decade, David worked in industry, completed a master's in business administration from Northwestern University, and served as a military instructor at Fort Riley, KS during the Korean War. He went on to earn his M.S. and Ph.D. from the University of Washington in 1957. In 1961, he and his family moved to Austin, Texas, where he would join the chemical engineering faculty at The University of Texas at Austin.

Dr. Himmelblau authored five outstanding chemical engineering textbooks: *Basic Principles and Calculations in Chemical Engineering* (in its 8th edition) with J.B. Riggs (BS/MS from UT-Austin, retired from Texas Tech University), *Process Analysis and Simulation* (1968) with K. Bischoff, *Process Analysis by Statistical Methods* (1970), *Applied Non Linear Programming* (1972), and *Optimization of Chemical Processes* (2011) with Tom Edgar and Leon Lasdon. His book, *Basic Principles and Calculations in Chemical Engineering* was recognized in 2010 as one of the most important books in the field of



David Himmelblau and his experimental apparatus when he was a graduate student at University of Washington

chemical engineering by the American Institute of Chemical Engineers (AIChE). In 1988 (with Josiah Hoskins), he published the first paper in the area of chemical engineering describing the potential of artificial neural networks. He was the inventor of one of the principal penalty function methods for NLP (with Newell), which is still used today, and he developed one of the key methods of estimating parameters in nonlinear differential equations. These are some of his numerous contributions to our profession.

Himmelblau was a past president, vice-president, trustee, and executive officer of the Computer Aids for Chemical Engineering Education (CACHE) Corporation, director of the AIChE, and past chair of the chemical engineering department of The University of Texas at Austin. During his career, he was awarded fellowship in the AIChE, the AIChE CAST Division Award, the AIChE Founders Award, the American Society for Engineering Education (ASEE) Joseph Martin Award, CACHE Award from the chemical engineering division of the ASEE, and the Joe J. King Professional Engineering Achievement Award given by UT-Austin. AIChE now presents a David Himmelblau Award for Innovations in Computer-Based Chemical Engineering Education in his honor.

David is survived by his wife of 62 years, Betty Hartman Himmelblau; his children and their spouses, Margaret and Don Nellor of Austin, and Andrew Himmelblau and Ellen Hurley of Bedford, MA; his grandchildren Travis Nellor of Austin and Stacie Nellor of Portland, OR; his brother Leo Himmelblau and family of Chicago, IL; and his sister-in-law Barbara Hartman of Wilmette, IL and family.

A leader within CACHE Corporation and dear friend of many, David M. Himmelblau's presence will truly be missed. Following are some thoughts from current and former CACHE Trustees and leading PSE researchers on the impact that David has had on their lives and careers.

I was sorry to hear of David's death. He was always searching for new ways to improve student learning. In the 1970s he contacted us when we were working on the MPS problem solving project so that he could share the findings with others. We'll miss his leadership and enthusiasm.

-Don Woods

That is sad news indeed. He certainly was a prominent figure in the process systems engineering community and a feisty character to boot.

-Rex Reklaitis

It is indeed very sad to hear that David had passed away. David was a very respectful scholar. I learned a lot from him when I was a postdoc under Tom Edgar in 1992-93. At that time, he discussed and revised my manuscript very seriously as a co-author, which was published in IEEE Trans. on Semiconductor Manufacturing, and I attended his group seminars regularly. When I left UT for Wayne State, he gave me a copy of his book on process statistics as a gift, which I used many times for preparing my lecture notes for a senior design course and a graduate level process integration course.

-Yinlun Huang

Dave's passing was sobering news. He will be remembered for his kindness and soft-touch. I remember as well his cool insight in both speech and writing and know our profession is richer for his career. Thank you for this opportunity to join all his friends in acknowledging his goodness.

-Bob Weaver

I am sad to learn the news of David's death. I knew him well and greatly admired him as a person and a scholar. He had a wonderful dry sense of humor. When I was new to this country he was very encouraging to me which I greatly appreciated. The first time I met him was after a research presentation I gave at an AIChE meeting in the late 1970's when he came up to me to tell me that he liked what I was doing and I should keep doing it. I knew who he was but he did not know me and he didn't have to take the time to encourage me - but he did and I still remember.

-Mike Doherty

I am deeply saddened. He was a great friend and a true scholar who did so much for chemical engineering. He amazed me with his desire to learn new things and participate at all times. He was always interested in what I did in my research as he always inquired. I learned many things from him including how to make budget presentations at cache which helped me during my administrative career.

-Yaman Arkun

The chemical engineering community has lost a great man with the passing of David Himmelblau. I admired his sophisticated sense of humor. I give two examples of such humor here. When talking about artificial intelligence, he asked CAST members if there was such a thing as "artificial stupidity." When talking to me about my presentations, he summarized: "Sometimes I think that you do not know what you are talking about, but you say it very well." His comment could be an epitaph for my tombstone.

-Peter Rony

It was with great sadness I was informed of the passing of David Himmelblau. Over the years I was an avid reader of David's many papers and books. It was a delight working with him in the CACHE Corporation. I was always grateful that he took time out to write letters of support for me to Monsanto administration for my activities both within and outside of Monsanto. His passing is a close of an era.

-Edward M. Rosen

I was deeply saddened by news of David's passing. David was one of the great individuals of our profession. Like many graduate students in the 1970's, my first encounter with David was through his early landmark papers on flowsheet structure and computations. Those papers were remarkable for their novelty and their especially clear elucidation of his ideas. But it wasn't until a few years later during a visit to Austin that I came to appreciate the full breadth of his contributions to scholarship and to the profession. He was always constructive, unselfishly offering helpful advice and thoughtful reflection. Whatever he had to say, it was delivered with a unique blend of scholarly precision and personal grace. He contributed enormously to the profession through his work on behalf of CACHE, AIChE, his own scholarship, and the development of a wide range of teaching materials.

-Jeff Kantor

I was very saddened to hear of the passing away of Dave Himmelblau. He was a giant in our profession. When I decided to run for Director of AIChE, told me what I needed to do it to win the election. He was a tireless worker for CACHE, donating more of his time to make CACHE successful than we will ever know. When CACHE was struggling financially to make ends meet, he came up with ideas that saved

CACHE. He was an inspiration to many, including myself. I always had the utmost respect for him and felt very fortunate to be associated with him.

-Bob Seader

It was sad to hear of David's passing, and it is a sad occasion for the chemical engineering community. David was a leading figure in computer aided process engineering. He developed and pioneered many of the topics, including computer-based modeling and simulation, nonlinear optimization, data handling and fault detection, that have become important and widely used components of our field. I am grateful that David provided me with support, advice and encouragement ever since I started in academia. I will especially cherish my opportunities to work with him on CACHE matters, where his commitment, organization, strong ethical standards and dry wit made a strong impression on me. David was a gentleman and a scholar.

-Larry Biegler

I was privileged to work closely with David on CACHE matters for a period of ten years. Few people come close to David with respect to integrity, sincerity, reliability and intelligence. My wife and I were fortunate to be the Himmelblaus' house guests when we came to Austin. There was great warmth behind what seemed, at times, to be a crusty exterior. When you needed him, he was there. I mourn his passing.

-Ernest Henley

I am indeed very sad to learn the passing away of Professor David Himmelblau, even though I was aware of his deteriorating health in recent years. As a pioneer in process fault detection and diagnosis, David was a mentor to me in this area. His book on this topic was and still is an important resource to approach this subject. As I got started doing research in this area in 1985 at Columbia University, David was very encouraging and supportive of my methods which had a huge impact on me. He was always there in the front row at the AIChE sessions during our presentations, asking important questions or making a tastefully crafted humorous remark.

As I served in CACHE, I got to know David some more. He was a classy gentleman -- warm, thoughtful, generous, kind and with a keen sense of dry wit. I started missing him in the sessions as his health did not permit him to attend AIChE meetings in recent years and I shall miss him even more now. But I will never forget David for all his contributions to our profession as well as to me personally.

-Venkat Venkatasubramanian

I was sorry to hear that David Himmelblau passed away. I first knew about David through his textbook "Basic Principles and Calculations in Chemical Engineering" when I was an undergraduate in Mexico City. That textbook had a positive impact on me as it taught me how to do systematic analysis on chemical engineering problems. I still have the copy of that text in my bookshelf. I met David at my first AIChE meeting in Philadelphia in 1978 and very much liked him because he came across to me as a kind person despite his strong reputation as a leader in the profession. Subsequently, at the CACHE meetings, when David was Executive Director, I got to know him quite well and enjoyed discussing with him research in optimization. Above all, however, I enjoyed his marvelous sense of humor.

-Ignacio Grossmann

I was very much saddened by David's passing. While I first learned of him as a graduate student through his publications and especially his book on optimization, I got to know him personally through CACHE. His help was invaluable when Tom McAvoy and I organized the Conference on Process Control CPC III in 1986. His efficient and non-bureaucratic approach ensured a smooth operation. I vividly remember his after dinner lecture upon receiving the CAST award that same year. This mix of deep insights, philosophy

of research and subtle humor was never surpassed. He has greatly impacted our profession in many ways.

-Manfred Morari

I remember David Himmelblau as a true gentleman - always accessible and interested in what you were doing. His book for the first course in chemical engineering was the first one I taught from when I joined the University of Washington to begin my career. It was also the one we organized a self-paced course around. It was later that I learned he got his PhD here working with Professor Al Babb ('57). In 1995, when I was chair, it was my pleasure to introduce him to our students as a Distinguished Alumnus of the Department. His talk was an inspiration to students as well as faculty. Dan Schwartz, currently our chair, said "As an assistant prof., I recall thinking what an honor it was to have a job in a dept that produced people like him."

-Bruce Finlayson

I am so sorry to learn of David's passing. He was a friend and mentor to all the CACHE trustees as well as a multitude of others. In my case he was extremely supportive and encouraging as I started to develop the interactive computer games for chemical reaction engineering back in 1977. Dave was also a guiding light in CACHE through his role as Executive Director and a member of the executive committee for many years. I learned so much from David about teaching techniques, textbook writing and educational philosophies. He was a very important person in my professional life.

-Scott Fogler

My condolences. Although I have not directly interacted with Prof. Himmelblau, he has had a major impact on me from my very first steps in chemical engineering learning about mass and energy balances and later learning about optimization. He has made tremendous contributions and has been a pillar of chemical engineering.

-Mahmoud El-Halwagi

Cheryl and I are of course saddened by this news. I had Dave for a class when I was an undergrad, and he helped me find a summer job at a chemical plant in Houston. He and Betty were always very nice to Cheryl and me when we came back to UT to join the faculty. Dave always had a unique and interesting point of view when he served on my students' thesis committees, especially if random variables or statistics came into the discussion. I always enjoyed my time with Dave. He treated people well and had a wonderful sense of humor.

-Jim Rawlings

My first contacts came with David through his wonderful book with Ken Bischoff, which introduced so many systems and modeling concepts in the 1960s. Then, his book on nonlinear programming that featured the Quasi-Newton methods was central to my research and lectures involving this subject. In the 1970s, David's comments after my research presentations gave me many ideas to consider. As CACHE Trustee and Executive Officer for nearly two decades, David was a major contributor to computers in chemical engineering education, and perhaps more importantly, to maintaining the day-to-day operations of CACHE, which was essential to the strong position it has retained for over 40 years.

- Warren Seider