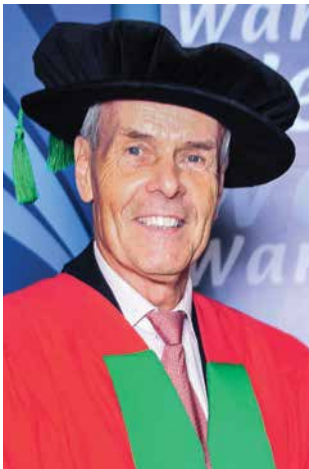


MIT professor funds future leaders at UCT

MIT Professor Klaus-Jürgen Bathe fell in love with South Africa when he was a student studying at UCT for his BSc in Civil Engineering and Engineering Mechanics in the 1960s, graduating as a gold medallist in 1967.



Having been a scholarship student himself, he is only too aware that financial and social support for talented students can make a huge difference in a person's life, whilst having a positive effect on many people.

Generously funding the KJ Bathe Scholarships at UCT since the 1990s, Professor Bathe established the KJ Bathe Leadership Programme in 2014. On his visits to South Africa, Professor Bathe was concerned about the problems

facing South Africa and the continent. He believes every country needs good leadership in key spheres of human activity to ensure a decent standard of living for all its citizens. He said "As a continent, Africa is blessed with abundant natural resources. However, to realise its full potential, the continent needs a critical mass of moral leaders committed to properly managing its wealth of resources, eradicating poverty and unemployment, and improving health and educational facilities for all".

Thus, his idea of a leadership programme at the University of Cape Town was born. In early 2014, he made a generous donation to establish the Klaus-Jürgen Bathe Leadership Programme. The programme's primary goal is to produce graduates with outstanding leadership qualities and a strong sense of social justice who would play significant roles in business, government, industry, and civil society in South Africa. Registered students from across all six faculties can apply for the scholarship.

"I love South Africa," he said. "To ensure a prosperous and peaceful future for all its citizens the countries in Africa, as all nations worldwide, we need excellent leaders. With good leadership, the dream of prosperity and peace for everyone will be realised," he added.

Heartwarming appreciation

For him, it has been heartwarming to receive thanks and appreciation from many of the KJ Bathe Leadership Scholars. There are now 71 KJ Bathe Leadership Scholars who are in, or have completed, the programme. In a letter one of the former recipients, Keabetswe Bonolo Skee wrote: "...on behalf of myself and my family I would like to thank you... As I venture off into the world, I will forever hold dear to my heart what this scholarship has meant in my life..."

Another recipient, Ryan Hudson, wrote: "My family and I never would have been able to put me through university without the scholarship. Beyond that, the amount I have learned through university, its activities and networking opportunities, has grown me as a person substantially and particularly enhanced my desire to establish good, effective leadership in my future endeavours."

Former KJ Bathe Leadership Scholar, Dr Amy Booth wrote: "...the support offered by your scholarship was pivotal in my academic journey. There was a point in my studies where my parents could no longer afford my fees and almost pulled me out of my medical degree. It was the KJB scholarship that allowed me to finish, and to go on to academic studies at Oxford. So, thank you!"

Finite element analysis pioneer

Klaus-Jürgen Bathe is considered to be one of the pioneers in the field of finite element analysis and its applications. Finite element analysis means using numerical methods implemented on computers to provide solutions to problems in engineering and the sciences. It is part of computational engineering.

He mentioned that "This field now encompasses the use of computations in solid, structural and fluid mechanics. The methods and computer programmes of computational engineering are widely used in practically all of engineering and the sciences."

"We find the results of computational engineering in our everyday life, in almost everything we work with, have fun with,

and need for our daily activities. Like the helmet we use when riding a bike, the motor car we ride in, and the cell phone we use daily – all these items have been designed using computational engineering.”

Southern African travels

He was born in Germany during the Second World War and was schooled there. He forewent his school graduation ceremony to travel to South Africa. Arriving in Cape Town, he hitchhiked to Namibia to stay with an uncle who owned a farm there. He soon realised he could not earn enough money in farming to save up for enrolment at a university. So after a about three months on the farm he travelled to Pretoria and got a job working for the road construction company, Labor, where he helped its surveyors on a road project in Nelspruit and thereafter the surveyors on a project near Pretoria. Within three months, he quickly learned how to use the surveying equipment – through a combination of learning on the job and studying surveying books. When the opportunity arose at Labor for a fully educated road surveyor, he was perfectly primed to take the job. He was asked to be the head surveyor back on the Nelspruit project. “In the evenings I studied books of pure and applied mathematics, because this material fascinated me. I also improved my English,” he said.

In late 1963, Klaus-Jürgen had saved enough money to return to Germany and pursue university studies, but when he told one of the Labor directors his plan, the director offered him a scholarship to study civil engineering in South Africa and the opportunity to work for Labor during his summer vacations at his current salary. “I thought that this was an excellent offer and I chose UCT. I was certainly thrilled to be able to study at UCT, the place I had visited about a year earlier and with which I had fallen in love already.”

UCT life

His study of applied mathematics while on the surveying job, equipped him well for his studies. “I enjoyed taking classes and studying at the university, the teachers and Professors at UCT were superb, and I enjoyed spending time at the pool or heading to the beach with friends in the afternoons. It was a wonderful life!” he exclaimed.

It was at UCT that he first became interested in automated structural analysis, which drove him to the library where he found many books on the subject. He recalled that through his reading he realised that automated structural analysis methods could be extended to include various other structures apart from beams. He became convinced that the computer would revolutionise the field of structural analysis and wrote an article about these ideas during his final year of study at UCT. “I felt that not only structural analysis would be revolutionised by the use of computers, but design in general, and in particular mechanical drawing, should surely be done through the use of computers,” he recounted.

He went on to study at the University of Calgary for an MSc and at the University of California, Berkeley for a PhD, where he attained a post-doctoral position.

ADINA is launched

As he stated “From the start of my research as a student, I was interested in the development of automated analysis procedures using finite element methods that would be reliable and effective, and which would ultimately be used in industrial applications.”

So in his last year at Berkeley, he planned for a new programme development. “I wanted to develop a new powerful finite element programme for linear and nonlinear, static and dynamic analysis.” This led to the new programme’s name, ADINA which means ‘Noble’ and ‘Distinct’.

Meanwhile he was headhunted from Berkeley by MIT where he went in January 1975. Before starting at MIT he completed his first book, which became an industry standard, *Numerical Methods in Finite Element Analysis*. His book *Finite Element Procedures* with its precursors is the most cited book in the field.

He thoroughly enjoyed his teaching responsibilities at MIT, especially two graduate courses that he had created on finite element methods, covering static and dynamic, steady-state and transient analyses of solids and fluids. Students from all engineering departments of MIT and also students from Harvard attended these courses.

His innovative teaching style was enjoyed by his students and he received three teaching awards, including the prestigious JP Den Hartog Distinguished Educator Award.

He was for over two decades, until December 2023, an Editor-in-Chief of the International Journal Computers & Structures and is now an Editor-in-Chief of the International Journal *Machine Learning for Computational Science and Engineering*.

Honorary doctorates

For his outstanding research accomplishments, and his connecting academia with industry, he received many honorary doctorates, including an honorary doctorate from UCT in 2013.

His work on ADINA eventually led him to establish the company ADINA R&D incorporated in 1986. It remained a relatively small company with him at the helm and maintained his interest in teaching and performing research at MIT. Although a small company, it was successfully competing against much larger companies and did very well. In fact, ADINA was regarded to continuously offer the state-of-the-art computational methods. As a result, ADINA R & D was acquired in 2022 by the American software company, Bentley Systems, Inc.

In summing up his philosophy on life, Professor Bathe emphasised the complexity of finding happiness in life: “I have been happy all along in my life, even when I had to struggle. Indeed to manage challenges successfully can be very fulfilling in that we experience new heights and possibilities within ourselves, while developing strength and new understandings, so that many times we emerge from struggles being a happier person. I consider myself to have been extremely blessed, and for that I have thanked God all along.”

For more on his life, please consult Prof. KJ Bathe’s webpage at MIT. His autobiography *To Enrich Life* (second edition) is available on amazon.com 