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Robert Vanderbei

Professor Robert Vanderbei, warmly known as Bob, transitioned to emeritus status on January 16, 2024, after a remarkable tenure spanning over thirty-three years at Princeton University. His journey began when he joined the former Department of Civil Engineering and Operations Research. From 1999 until his retirement, Bob was a professor in the Department of Operations Research and Financial Engineering (ORFE). Notably, he also served as the chair of ORFE from 2005 to 2012. Beyond his primary role, Bob holds courtesy appointments in several diverse fields, including mathematics, astrophysics, computer science, mechanical and aerospace engineering, and applied mathematics.

His many varied interests budded in childhood and have been notable across his scholarly pursuits. Bob's roots trace back to Grand Rapids, Michigan, where he and his twin sister, Beth, were born on October 8, 1955. As a child, he developed a deep appreciation for art and science. He recalls being delighted when in sixth grade Ken-O-Sha Elementary School recognized his talent by purchasing one of his oil paintings. Bob's fascination with space exploration was ignited at an even earlier age as he witnessed the birth of the National Aeronautics and Space Administration (NASA) and became enthralled with its mission to send astronauts to the moon and back. Bob avidly followed every rocket launch, hoping to one day become an astronaut himself. However, when his tenth-grade teacher informed him that NASA would no longer be sending astronauts to the moon, Bob began envisioning new life paths as there seemed to be no future in that direction.

His adventurous spirit was also nurtured along the way. Bob's parents taught him how to ski when he was just three years old. Following in his mother's footsteps, he became a National Ski Patrolman in his senior year of high school. Tennis also became a significant part of his life, and he has actively participated in the sport from the age of fifteen.

In high school, Bob immersed himself in math and science, and upon graduation he enrolled at Rensselaer Polytechnic Institute, where he graduated with a bachelor's degree in chemistry in just three years and a master's degree in operations research and statistics. He decided to pursue a Ph.D. in applied mathematics from Cornell University and had the honor of being advised by the famous probabilist Eugene Dynkin. While at Cornell, Bob followed other interests, as well. He trained as a glider pilot and eventually became a certified glider flight instructor, later assuming the role of chief flight instructor at the Central Jersey Soaring Club. Soon after receiving his Ph.D. in 1981, Bob spent one year as a National Science Foundation-funded postdoc at New York University's Courant Institute of Mathematical Sciences. Upon completion of his appointment, he then spent two years as a postdoc in the mathematics department at the University of Illinois at Urbana-Champaign, where he met his wife, Krisadee.

Bob deviated from his path in academia to work at AT&T Bell Labs in 1984. During his employment, his research interest shifted from the abstract realms of probability theory to the practical challenges of linear and nonlinear optimization. Bob emerged as the lead developer behind Korbx, a groundbreaking commercial optimization tool. Based on his research in a broad spectrum of topics in probability, optimization, and computing, he received an offer to come to Princeton in 1990.

For many of his early years at Princeton, Bob taught the intro to computer programming course—a prerequisite for all engineering majors. Each year he created a new final project that was significantly different from the ones in previous semesters, fostering the ideals of innovation and perpetual reinvention. Among these projects was one that contributed to American political conversation. In the autumn of 2000, Bob was intrigued by an article in USA Today that outlined the results of the presidential election by depicting county-by-county map comparisons using the colors red and blue. Bob, residing just north of Princeton in Somerset County, knew that George W. Bush beat Al Gore by only a few percentage points and thought the map would be more interesting if the color was a mix of red and blue to match the proportion of Republican and Democratic votes. In such a map, many counties in the United States would look purple. Four years after he made it the final project of his computer programming course and posted it to his personal webpage, Bob's map went viral and in 2004 the innovative concept of "Purple America" was born.

Among the courses Bob taught were undergraduate and graduate optimization courses that were required for ORFE students. In 1995, he wrote a textbook titled Linear Programming: Foundations and Extensions. Over the years it has become a popular textbook, and it is currently in its fifth edition.

Bob's childhood interest in astronomy was reignited when his friend Kirk Alexander, director of the Amateur Astronomers Association of Princeton, invited him to a star party in 1999. After this event, Bob quickly became an active astrophotographer. Being a faculty fellow at Forbes College, Bob received an invitation in 2002 to attend a talk by Princeton astrophysicist Ed Turner about the possibility of finding life on other planets outside of our solar system. In his talk, Turner spoke of a "to-be-designed-and-built" NASA space telescope called the Terrestrial Planet Finder (TPF). It was made clear that creating a telescope with the ability to directly image Earth-like planets orbiting sun-like stars would be extremely difficult. Bob saw the opportunity this challenge presented and approached Turner about using his optimization tools to help design such a telescope. Turner introduced Bob to professors Jeremy Kasdin and David Spergel, which led them to coauthor several papers together. Unfortunately, in 2008 the recession caused NASA's TPF project to be canceled. However, research on high-contrast imaging has become quite popular and many scientists at various NASA labs are still working on this today.

Due to his research on high-contrast imaging and his passion for astrophotography, Bob became acquainted with many faculty in the Department of Astrophysical Sciences. His collaboration with J. Richard Gott resulted in several projects, one being a coauthored book titled Sizing Up the Universe, published by National Geographic in 2010. Sharing an interest in human perspective and 3D experience, Bob and Richard, along with Michael Strauss and the director of the Hayden Planetarium, Neil deGrasse Tyson, coauthored the book Welcome to the Universe in 3D. It has stereoscopic pairs of images throughout its pages and a built-in viewer that brings the 3D experience to the average person. This book was published in 2021 by Princeton University Press and on the day it was released, Neil deGrasse Tyson promoted the book as a guest on The Late Show with Stephen Colbert. The next day, the book was the number one bestseller of all books on Amazon.com.

Bob's work has earned him many accolades throughout his life. He is a fellow of the American Mathematical Society (AMS), the Society for Industrial and Applied Mathematics (SIAM), and the Institute for Operations Research and Management Science (INFORMS). In 2017, he was the winner of the INFORMS Optimization Society's top award, the Khachiyan Prize. In 2023, he was awarded the School of Engineering and Applied Science Excellence in Mentoring prize here at Princeton. In the same year, a conference in his honor was held on campus to celebrate Bob's illustrious academic journey. The conference title, "From One Star to Another: An Optimal Journey through the Interior of the Universe," might strike some as unconventional. However, for those acquainted with Bob's work, it resonates deeply. Bob's profound influence on interior point methods in optimization and his groundbreaking applications in astronomy reflect his insatiable curiosity for unraveling the mysteries of the cosmos. Bob's legacy will continue to illuminate pathways for future generations of scholars, inspiring them to reach for the stars in both their academic pursuits and their quest to understand the universe.

Written by members of the Department of Operations Research and Financial Engineering faculty.