The Mathematical Sciences in 2025

Committee

Thomas E. Everhart

Chair

Thomas E. Everhart (NAE) is President Emeritus of the California Institute of Technology and Professor Emeritus of Electrical Engineering and Applied Physics. He received a Ph.D. in engineering from Cambridge University, England in 1958. Dr. Everhart joined the University of California at Berkeley in 1958, where he served in the Department of Electrical Engineering and Computer Science for more than 20 years. After being Dean of Engineering at Cornell University (1979-84) and Chancellor of the University of Illinois at Champaign-Urbana (1984-87), he accepted the presidency at Caltech in 1987. He holds a guest appointment at the University of California at Santa Barbara as a Distinguished Visiting Professor and Senior Advisor to the Chancellor. Dr. Everhart's honors and awards include the IEEE Centennial Medal; the 1989 Benjamin Garver Lamme Award from the American Society for Engineering Education; the Clark Kerr Award from UC Berkeley in 1992; the Founder's Award in 1995 from the Energy and Resources Group at Berkeley; and the IEEE Founders Medal and Okawa Prize in 2002. He currently serves on the board of trustees of Caltech and has served on the board of overseers of Harvard University.

Mark L. Green

Vice Chair

Mark L. Green is a professor in the Department of Mathematics at the University of California at Los Angeles. He received his BS from the Massachusetts Institute of Technology and his MA and PhD from Princeton University. After teaching at the University of California at Berkeley and MIT, he came to UCLA as an assistant professor in 1975. He was a founding co-director of the NSF-funded Institute for Pure and Applied Mathematics. Dr. Green's research has taken him into different areas of mathematics: several complex variables, differential geometry, commutative algebra, Hodge theory, and algebraic geometry. He received an Alfred P. Sloan fellowship, was an invited speaker at the International Congress of Mathematicians in Berlin in 1998, and was recently elected as a Fellow of the American Academy of Arts & Sciences.

Tanya S. Beder

Member

Tanya Styblo Beder is chair of SBCC Group, a financial and risk consulting firm that she founded in 1987. From 1994 through 2005, Ms. Beder held two senior positions in the asset management industry, first as Managing Director of Caxton Associates LLC, a $10 billion asset management firm, then as CEO of Tribeca Global Management LLC, a $3 billion dollar multi-strategy fund. At SBCC Group, Ms. Beder heads the global strategy, crisis and risk management, derivatives, workout and fund launch practices. Ms. Beder's career includes numerous projects borne from the financial distress of the stock market crashes of 1997, 2001 and 2008; the asset/liability and savings & loan crises of the late 1980s; the derivatives losses of the 1990s; the LTCM and currency crises in 1998; and the bursting of the credit bubble and meltdown that started in 2007. Ms. Beder is a member of the Board of Directors of the International Association of Financial Engineers where she co-chairs its Investor Risk Committee. From 1998 through 2003 she was Chairman of that Association. Euromoney named Ms. Beder one of the top 50 women in finance around the world. Ms Beder was an author of "Risk Standards for Institutional Investors and Institutional Investment Managers" and has written numerous articles in the financial area. She holds an M.B.A. in finance from Harvard University and a B.A. in mathematics from Yale University. She was a member of the NSF's "Odom Committee" in the mid-1990s (chaired by Gen. William Odom), which performed the last introspective study of the mathematical sciences.

James O. Berger

Member

James O. Berger (NAS) is Arts and Sciences Professor in the Department of Statistical Science at Duke University. He received a PhD in mathematics from Cornell University in 1974. Dr. Berger was a faculty member in the Department of Statistics at Purdue University until 1997, at which time he moved to Duke. From 2002 until 2009 he directed the NSF-supported Statistical and Applied Mathematical Sciences Institute (SAMSI). Dr. Berger was president of the Institute of Mathematical Statistics from 1995-1996, chair of the Section on Bayesian Statistical Science of the American Statistical Association in 1995, and president of the International Society for Bayesian Analysis during 2004. Among his awards and honors are Guggenheim and Sloan Fellowships, the President's Award from the Committee of Presidents of Statistical Societies in 1985, the Sigma Xi Research Award at Purdue University for contribution of the year to science in 1993, the Fisher Lectureship in 2001, election as foreign member of the Spanish Real Academia de Ciencias in 2002, election to the NAS in 2003, an honorary Doctor of Science degree from Purdue University in 2004, and the Wald Lectureship in 2007. Prof. Berger currently chairs the NSF's Advisory Committee for Mathematics and Physical Sciences, which deals with some of the same issues as does the study on the Mathematical Sciences in 2025. Berger's research has primarily been in Bayesian statistics, foundations of statistics, statistical decision theory, simulation, model selection, and various interdisciplinary areas of science and industry, especially astronomy and the interface between computer modeling and statistics. He has supervised 31 PhD dissertations, published over 160 articles, and written or edited 14 books or special volumes.

Luis A. Caffarelli

Member

Luis Caffarelli obtained his Masters of Science (1969) and Ph.D. (1972) at the University of Buenos Aires. Since 1996 he has held the Sid Richardson Chair in Mathematics at the University of Texas at Austin. He also has been a professor at the University of Minnesota, the University of Chicago, and the Courant Institute of Mathematical Sciences at New York University. From 1986 to 1996 he was a permanent member at the Institute for Advanced Study in Princeton. In 1991, he was elected to the National Academy of Sciences. He received the Bôcher Prize in 1984. In 2005, he was honored to receive the prestigious Rolf Schock Prize in Mathematics of the Royal Swedish Academy of Sciences. He recently received the Leroy P. Steele Prize for Lifetime Achievement in Mathematics. Professor Caffarelli is a member of the American Mathematical Society, the Union Matematica Argentina, the American Academy of Arts and Sciences, the National Academy of Sciences and the Pontifical Academy of Sciences. The focus of Professor Caffarelli's research has been in the area of elliptic nonlinear partial differential equations and their applications. His research has reached from theoretical questions about the regularity of solutions to fully nonlinear elliptic equations to partial regularity properties of Navier Stokes equations. Some of his most significant contributions are the regularity of free boundary problems and solutions to nonlinear elliptic partial differential equations, optimal transportation theory and, more recently, results in the theory of homogenization.

Emmanuel J. Candes

Member

Emmanuel J. Candes is a professor of statistics and mathematics at Stanford University. He is considered to be an unusually broad mathematical scientist, having carried out (at a young age) noteworthy research into compressive sensing, mathematical signal processing, computational harmonic analysis, multiscale analysis, scientific computing, statistical estimation and detection, high-dimensional statistics, theoretical computer science, mathematical optimization, and information theory. He received his Dipl. from Ecole Polytechnique and his PhD in statistics from Stanford in 1998.

Phillip Colella

Member

Phillip Colella (NAS) is Senior Mathematician and Group Leader of the Applied Numerical Algorithms Group at the E. O. Lawrence Berkeley National Laboratory. He is a leader in the development of mathematical methods and computer science tools for science and engineering. His work has resulted in software tools applicable in a wide variety of problems in fluid dynamics, shock wave theory, and astrophysics. Dr. Colella received an A.B. and PhD from the University of California, Berkeley. A former member of BMSA, he was an excellent contributor to a recent DEPS/DELS study on high-end capability computing. He was recommended by BMSA director Scott Weidman.

David Eisenbud

Member

David Eisenbud was Director of the Mathematical Sciences Research Institute in Berkeley from 1997 until 2007, and he continues to serve on the faculty of the University of California at Berkeley as Professor of Mathematics. He received his PhD in mathematics in 1970 at the University of Chicago. Dr. Eisenbud was on the faculty at Brandeis University for 27 years before coming to Berkeley. He has been a visiting professor at Harvard, Bonn, and Paris. His mathematical interests range widely over commutative and non-commutative algebra, algebraic geometry, topology, and computer methods. He was President of the American Mathematical Society in 2004 and 2005 and is a Director of Math for America, a foundation devoted to improving mathematics teaching. In 2006, Dr. Eisenbud was elected a Fellow of the American Academy of Arts & Sciences. He currently serves on the editorial boards of the Journal of Algebra and Number Theory, the Bulletin du Societe Mathematique de France, Computing in Science & Engineering, and Springer-Verlag's book series Algorithms and Computation in Mathematics.

Peter W. Jones

Member

Peter Wilcox Jones (NAS) is the James E. English Professor of Mathematics & Applied Mathematics at Yale. He received his doctorate from UCLA in pure mathematics in 1978, and began his lifelong international collaborations during his graduate studies when he relocated to Paris during his advisor's year-long sabbatical to the University of Paris at Orsay. Dr. Jones began his academic career at the University of Chicago in 1978 where he served for two years as assistant director of the Institut Mittag-Leffler, a research branch of the Royal Swedish Academy of Sciences. Dr. Jones received the Salem Prize in 1981, an award given annually to a young mathematician who has done outstanding work in the theory of Fourier series. Jones joined the Department of Mathematics at Yale in 1985, where he currently works with a large group that focuses on the value of math in biology and medicine for creating models. Since its inception in 1999, he has served as the chair of the Science Advisory Board at IPAM, a mathematics research institute at UCLA created and funded by the NSF. Dr. Jones is a Sloan Fellow, a foreign member of the Swedish Academy of Science, and a member of the American Academy of Arts & Sciences.

Ju-Lee Kim

Member

Ju-Lee Kim is an associate professor of mathematics at MIT. She received a B.S. from the Korean Advanced Institute in Science & Technology in 1991, and a PhD from Yale in 1997, under the direction of NAS member Roger Howe. She had postdoctoral appointments at the École Normale Supérieure and the Institute for Advanced Study before joining the University of Michigan as assistant professor in 1998. In 2002, she moved to the University of Illinois at Chicago. Professor Kim's research interests include representation theory, harmonic analysis of p-adic groups, Lie theory, and automorphic forms.

Yann A. LeCun

Member

Yann LeCun has been a Professor of Computer Science at the Courant Institute of Mathematical Sciences at NYU since 2003 and was named Silver Professor in 2008. LeCun received a PhD in Computer Science from the Université Pierre et Marie Curie, Paris in 1987. LeCun joined the Adaptive Systems Research Department at AT&T Bell Laboratories in Holmdel, NJ in 1988, where he later became head of the Image Processing Research Department, part of Larry Rabiner's Speech and Image Processing Research Lab at AT&T Labs-Research in Red Bank, NJ. In 2002, he became a Fellow of the NEC Research Institute (now NEC Labs America) in Princeton, NJ. He then began his tenure at NYU, where he remains. Dr. LeCun's research focuses on machine learning, computer vision, pattern recognition, neural networks, handwriting recognition, image compression, document understanding, image processing, VLSI design, and information theory. His handwriting recognition technology is used by several banks around the world, and his image compression technology is used by hundreds of web sites and publishers and millions of users to access scanned documents on the Web.

Jun Liu

Member

Jun Liu is a professor of statistics at Harvard University and of biostatistics in the Harvard School of Public Health. His research deals with statistical imputation, Gibbs sampling, graphical models, genetics, image reconstructions, and other methods of biostatistics and bioinformatics. He holds a B.S. in mathematics from Peking University (1985) and a PhD in statistics from the University of Chicago (1991). Prof. Liu began his career at Harvard in 1991, was at Stanford in 1994-2000, and returned to Harvard in 2000. His honors include selection as a Medallion Lecturer of the Institute for Mathematical Statistics (IMS) in 2002; receipt of the 2002 COPSS Presidents' Award, given annually by five leading statistical societies to a young individual for outstanding contributions to the profession of statistics; election as an IMS Fellow in 2004; and selection as Bernoulli Lecturer by the Bernoulli Society, 2004. He is author of Monte Carlo Strategies in Scientific Computing (2001), has overseen 18 PhD students, and has contributed to 18 software modules for computational biology.

Juan Maldacena

Member

Juan Maldecena is a theoretical physicist at the Institute for Advanced Study. Among his many discoveries, the most famous one is the AdS/CFT correspondence, the conjecture about the equivalence of string theory on Anti de Sitter (AdS) space and a conformal field theory defined on the boundary of the AdS space. Dr. Maldacena obtained his “licenciatura” (a 6 years degree) in 1991 at the Instituto Balseiro from the Universidad Nacional de Cuyo, Bariloche, Argentina. He then obtained his PhD at Princeton University under the supervision of Curtis Callan in 1996 and went on to a post-doctoral position at Rutgers University. In 1997, he joined Harvard University as associate professor, being quickly promoted to Professor of Physics in 1999. Since 2001 he has been a professor at the Institute for Advanced Study in Princeton, New Jersey. He has the Edward A. Bouchet Award of the American Physical Society (2004), the Xanthopoulos International Award for Research in Gravitational Physics (2001), the Sackler Prize in Physics, a MacArthur Fellowship in 1999, and the Dirac Medal in 2008.

John W. Morgan

Member

John W. Morgan (NAS) is Director of the Simons Center for Geometry and Physics at SUNY-Stony Brook. He received his BA and PhD in mathematics from Rice University in 1968 and 1969, respectively. He was an instructor at Princeton University from 1969 to 1972, and an assistant professor at MIT from 1972 to 1974. He has been on the faculty at Columbia University since 1974. In July 2009, Prof. Morgan moved to Stony Brook University to become the first director of the Simons Center for Geometry and Physics. He has been a Visiting Professor at Harvard University, Stanford University, The Université de Paris, The Mathematical Sciences Research Institute, the Institute for Advanced Study, and The Institut des Hautes Etudes Scientifiques. He is an editor of the Journal of the American Mathematical Society and Geometry and Topology.

Yuval Peres

Member

Yuval Peres obtained his PhD in 1990 from the Hebrew University in Jerusalem, working under Hillel Furstenberg. In 1993, Peres joined the faculty of the statistics department at the University of California at Berkeley, where he served as a professor in the mathematics and statistics departments until moving recently to Microsoft Research to manage the Theory Group. Peres’s research is extraordinarily prolific and collaborative, encompassing a broad range of topics in theoretical probability. His research could be characterized as probability on infinite discrete structures where geometry plays a role. This includes, for instance, the study of random percolation on infinite Cayley graphs, where (in contrast to the usual d-dimensional lattice setting) one has the possibility of coexistence of infinitely many infinite components. Peres’s work illustrates and delineates active and exciting areas where probability meets other areas of pure mathematics.

Eva Tardos

Member

Eva Tardos (NAE) is the Jacob Gould Schurman Professor of Computer Science at Cornell University, and was department chair 2006-2010. She received her BA and PhD from Eötvös University in Budapest. She had a Humboldt Fellowship at the University of Bonn, a postdoctoral fellowship at the Mathematical Sciences Research Institute in Berkeley, a postdoctoral fellowship from the Hungarian Academy of Sciences at Eötvös University, was a visiting professor at Department of Mathematics at MIT 1987-89. before joining the faculty at Cornell. Dr. Tardos won the Fulkerson Prize, awarded jointly by the Mathematical Programming Society and the American Mathematical Society, and the Dantzig prize awarded jointly by Mathematical Programming Society and the Society for Industrial and Applied Mathematics. She was awarded an Alfred P. Sloan Research Fellowship (1991-93), a National Science Foundation Presidential Young Investigator Award (1991-96), and the David and Lucille Packard Foundation Fellowship in Science and Engineering (1990-95), a Guggenheim Fellowship (1999-2000). She is an ACM Fellow, INFORMS fellow, and SIAM fellow, is a member of the American Academy of Arts and Sciences and was elected to the National Academy of Engineering. Dr. Tardos’s research interest is algorithms and algorithmic game theory, the subarea of computer science theory of designing systems and algorithms for selfish users. Her research focuses on algorithms and games on networks. She is most known for her work on network-flow algorithms, approximation algorithms, and quantifying the efficiency of selfish routing.

Margaret H. Wright

Member

Margaret H. Wright (NAS/NAE) is Silver Professor of Computer Science at the Courant Institute of Mathematical Sciences,New York University. She received an M.S. and a PhD in Computer Science, and a B.S. in Mathematics, all from Stanford University. Before joining NYU in 2001, she was a Distinguished Member of Technical Staff and Bell Labs Fellow at Bell Laboratories, Lucent Technologies. Her research interests include optimization, linear algebra, scientific computing, and real-world applications. She is the co-author of two books, Practical Optimization and Numerical Linear Algebra and Optimization, and the author or co-author of many research papers. She has chaired the Advisory Committee for the Mathematical and Physical Sciences Directorate at the NSF, and the Advanced Scientific Computing Advisory Committee for the US Department of Energy; she has also served on several other committees for the NSF and the NRC. She is a member of the scientific advisory board of the DFG Research Center "Matheon" (Berlin), and of the Center for Industrial and Applied Mathematics (Sweden); she is chair of the 2010 International Review of Mathematical Sciences Research in the United Kingdom. She is a fellow of the American Academy of Arts and Sciences, and she has received a Doctorate in Mathematics (honoris causa) from the University of Waterloo (Canada) and an honorary Doctorate of Technology from the Royal Institute of Technology (KTH), Sweden.

Joe B. Wyatt

Member

Joe B. Wyatt served as chancellor and CEO of Vanderbilt University from 1982 to 2000. During that time, he led Vanderbilt's ascent into the top tier of U.S. teaching and research universities. He oversaw the expansion of the university's academic offerings and diversity of the student body and the increase of Vanderbilt's endowment from $170 million to more than $2 billion. Prior to joining Vanderbilt, Prof. Wyatt was a member of the faculty and administration at Harvard University, serving as Vice President for Administration from 1976 to 1982. During this period, he led EDUCOM, a consortium of 450 universities that developed computer networks and systems for sharing information and resources. In addition Mr. Wyatt co-authored the book, Financial Planning Models for Colleges and Universities, and wrote numerous papers and articles in the fields of technology, management and education. Mr. Wyatt's earlier career focused on computer science and systems, beginning at General Dynamics Corporation in 1956, and continuing at Symbiotics International, Inc., a company he co-founded in 1965. Mr. Wyatt was a co-founder, Vice Chairman of the Board, and Chairman of the Investment Committee for the Massachusetts Technology Development Corporation, a public/private venture capital group that has financed a large number of successful technology-based companies in Massachusetts. He is former Chairman of the NRC's Government-University-Industry Research Roundtable and is currently Chairman of the Board of the Universities Research Association.