Hungarian-born US physicist and mathematician who originated games theory and developed the fundamental concepts involved in programming computers. He also made a valuable contribution to quantum mechanics.

Von Neumann was born in Budapest on 28 December 1903. He received private instruction until 1914, when he entered the Gymnasium, and even then continued to be tutored outside school in mathematics because of the exceptional ability that he displayed in the Oppenheimer, and held the post of Privatdozent (unpaid lecturer) in mathematics at the University of Berlin 1927-29.

After a year as lecturer at the University of Hamburg, Von Neumann travelled to the USA in 1930. Holding first the position of visiting professor, he became full professor of mathematics at the University of Princeton in 1931. He held this position until 1933, when he was invited to become the youngest member of the newly established Institute of Advanced Studies at Princeton University. Von Neumann was a member of this institute for the rest of his career, although he also held a number of important advisory posts with the US government 1940-54.

During World War II, Von Neumann served as a consultant for various committees within the navy, army, the Atomic Energy Commission, and the Office for Scientific Research and Development. He was associated with research projects at Los Alamos 1943-55, working under Oppenheimer on the A-bomb project and also under Edward Teller on the H-bomb project. The importance of Von Neumann's scientific contributions brought him widespread recognition, including the award of the Medal of Freedom, the Albert Einstein Award, and the Enrico Fermi Award - all in 1956. His health had begun to fail in 1955, and he died of cancer in Washington, DC on 8 February 1957.

Pure mathematics was Von Neumann's primary scientific interest during the first years of his career. He made important contributions to the >In 1928 Von Neumann read a paper on games theory to a scientific meeting in Göttingen. This was an entirely new >Applied mathematics in the field of theoretical physics held a strong fascination for Von Neumann. He began to work on the axiomization of quantum mechanics in 1927, and in 1932 published a book entitled *The Mathematical Foundations of Quantum Mechanics*. This defended mathematically the uncertainty principle of Werner Heisenberg. In 1944, Von Neumann made another very important contribution to quantum mechanics when he showed that the systems of matrix mechanics developed by Heisenberg and Max Born and of wave mechanics developed by Erwin Schrödinger were equivalent. Von Neumann also published papers with Subrahmanyan Chandrasekhar on gravitational fields. Work on pure mathematics also continued and in particular he collaborated with Francis Murray in an investigation of noncommutative algebras during the latter part of the 1940s.

Work on the atom bomb project brought a variety of new problems, many of them completely different from those Von Neumann had previously encountered. The necessity for quickly producing approximate models for complex physical problems encouraged Von Neumann to examine and develop
improvements for the available computing machines. During the war he contributed to work on hydrodynamics and on shock waves, and afterwards he spent a great deal of effort designing and then supervising the construction of the first computer able to use a flexible stored program (named MANIAC-1) at the Institute of Advanced Study in 1952. This work laid the foundations for the design of all subsequent programmable computers.

Von Neumann also developed his games theory, and in 1944 published Theory of Games and Economic Behavior with Oskar Morgenstern, his major work on the >Von Neumann was a mathematician with an exceptional talent for absorbing the essential features of all the important branches of both mathematics and theoretical physics, and he was also adept at the applications of his theoretical work. He demonstrated great originality and imagination in his pioneering efforts in the areas of computer design and especially in games theory.

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