

## **Biographical Sketch**

Bernard Russo

I was born in 1939 as an Italian citizen on what is now the Greek Island of Rhodes. My family moved to Los Angeles in 1940 where I grew up and went to school (Dorsey High School and UCLA). Together with my parents and siblings I became an American citizen in 1957. I was married in 1963 and have two children and four grandchildren.

Needless to say, I was a math whiz in high school but I also liked physics very much. I started out as an Engineering major at UCLA but quickly changed to mathematics, obtaining a BA, MA, and a PhD. Near the end of my high school days my musical taste changed from Rock and Roll to classical music. Near the end of my undergraduate studies I began taking piano lessons, which has continued, on and off, to the present. I can say that my two passions in life are mathematics and music.

In my undergraduate days, my taste in mathematics moved from number theory to analysis. My research has always been in a subject called Functional Analysis, which can be described roughly as infinite dimensional calculus. I have authored or co-authored 60 peer reviewed research papers during the last 50 years, which is about average for an active researcher in mathematics.

I moved to Orange County in 1965 to join the new campus of the University of California, Irvine. Forty years later I retired from teaching but continued my research and professional duties in mathematics. It was then that I began teaching freshman seminars, thereby learning about branches of mathematics which are not related to my specialty, and which I did not have time or motivation to explore in my youth.

**Reflections on  
Millennium Problems; the freshman seminar**  
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My main purpose in offering this seminar (and earlier ones) was that it gave me the chance to talk about mathematics without worrying too much about exams and grading, or coming to campus more than once a week. Preparations forced me to learn about the great achievements of my subject, but not necessarily rigorously, which would have been very time consuming and is not necessary for a modest appreciation of the results. In the past I have offered freshman seminars on the Riemann Hypothesis, Cryptography (Secret Codes), Nonassociative Algebra, Math for the Environment, Sudoku, Love and Math (Beauty of Math), Evolution Algebra.

The current seminar was originally intended to explain the 7 millennium problems, each carrying a prize of one million dollars for its solution. I ended up covering only three of them (Riemann Hypothesis, Birch and Swinnerton-Dyer Conjecture, Poincaré Conjecture), but to compensate for the omissions, four epic problems of mathematics (Fermat's Last Theorem, Four Color Theorem, Poincaré Conjecture, Classification of atomic symmetries), each of which took over a century to solve, were presented, including one of the Millennium Problems.

A good deal of time was spent on number theory (prime and composite numbers), including the Prime Number Theorem, Theorems of Euclid (uniqueness in the Fundamental Theorem of Arithmetic, infinitude of the primes), Pythagorean triples, Irrational numbers, primes in an arithmetic progression, bounded gaps between primes (Zhang's progress on the Twin Prime Conjecture). Some other topics that entered the discussion were Pythagorean Theorem, Platonic Solids, Clock Arithmetic, Networks (Euler formula  $V-E+F=1$ ), Symmetry.