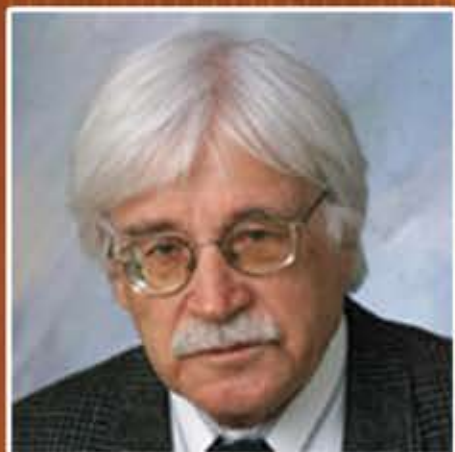


## Department of Computer Science 25<sup>th</sup> Anniversary

# Distinguished Lecture Series



### Prof. Walter Gautschi

Professor Emeritus, Department of Computer Science  
Purdue University, USA

## The Spiral of Theodorus, Numerical Analysis, and Special Functions

March 14, 2014 (Fri) 4:30pm

WLB109, Wing Lung Bank Building, Shaw Campus, HKBU

**Abstract:** Theodorus of Cyrene (ca. 460–399 B.C.), teacher of Plato und Theaetetus, is known for his proof of the irrationality of  $\sqrt{n}$ ,  $n = 2, 3, 5, \dots, 17$ . He may have known also a discrete spiral, today named after him, whose construction is based on the square roots of the numbers  $n = 1, 2, 3, \dots$ . The subject of this lecture is the problem of interpolating this discrete, angular spiral by a smooth, if possible analytic, spiral. An interesting solution has been proposed twenty years ago by P.J. Davis, which is based on an infinite product. The computation of this product gives rise to problems of numerical analysis, in particular the summation of slowly convergent series, and the identification of the product to questions regarding special functions. The former are solved by a method of integration, in particular Gaussian integration, the latter by means of Dawson's integral and the Bose–Einstein distribution. Number-theoretic questions also loom behind this work.

**Biography:** W.G.. Ph.D., University of Basel, 1953 (thesis advisor: Prof. A. Ostrowski); Post Doc at Istituto Nazionale per le Applicazioni del Calcolo, Rome and at Harvard Computation Laboratory; Research Mathematician at the National Bureau of Standards, Washington, DC, 1956–1959 and at Oak Ridge National Laboratory, 1959–1963; Professor of Mathematics and Computer Science, Purdue University, 1963–2000; Professor Emeritus, since 2000. Fulbright Scholar at the Technical University of Munich, 1970–1971; Visiting Professorships at the University of Wisconsin, 1971–1977, and at various other academic institutions, notably the University of Padua, the Polytechnics of Milan and Turin, ETH Zurich, and the University of Basel. Lecturer at numerous national and international meetings; Invited Lecturer at anniversary meetings for Christoffel (Aachen, 1979), Tricomi (Rome, 1997), Euler (Zurich, 2007), and Lagrange (Turin, 2013). Foreign member of the Bavarian Academy of Sciences (since 2001) and the Turin Academy of Sciences (since 2001). Selected works with commentaries published 2014 in three volumes by Birkhäuser.

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