

Department of Mathematics and Statistics  
University of Vermont

President's Distinguished Lecture Series

**Dr. Peter D. Lax**

Professor Emeritus of Mathematics,  
Courant Institute of Mathematical Sciences  
New York University

Dr. Lax will be at UVM from October 14 through October 16, 2009.

*Dr. Lax is one of the world's foremost mathematical scientists and the most dominant figure in applied mathematics of our era. His numerous seminal discoveries, often at the interface of mathematics and physics, have fundamentally changed major areas of research and are the basis for a wide range of engineering applications. Dr. Lax has received numerous honorary degrees and national and international awards including the President's Medal of Science and the Abel Prize, also known as the Nobel Prize of Mathematics.*

Dr. Lax's visit is co-sponsored by the Departments of Mathematics, Physics, and Computer Science.

On **Wednesday, October 14, 4:00 to 5:00PM**, Dr. Lax will give his Presidential Lecture:

**John von Neumann: The Most Powerful Mind of the 20<sup>th</sup> Century**

**Abstract:** Today, more than fifty years after his death, John von Neumann looms larger than ever as one of the most significant scientists of the 20<sup>th</sup> century, among its greatest mathematicians, a father of the modern computer and computational science, and a prophet of the age of technology. My twin aims are to paint a picture of the power and sweep of his mind and to describe how his ideas shaped the future.

Location: Billings North Lounge

Reception immediately following the lecture in Billings Marsh Lounge

On **Thursday, October 15, 4:00-5:00PM**, Dr. Lax will give a colloquium lecture:

**Degenerate Matrices**

**Abstract:** A real symmetric matrix is called degenerate by physicists if it has a multiple eigenvalue. Wigner and von Neumann showed long ago that the degenerate matrices form a variety of codimension two in the space of all symmetric matrices. This explains the phenomenon of 'avoidance of crossing.'

I will show that if  $A$ ,  $B$ , and  $C$  are  $n \times n$  real symmetric matrices and  $n$  is congruent 2 mod 4, there always exist three real numbers  $a$ ,  $b$ , and  $c$ , not all zero, such that  $aA + bB + cC$  is degenerate. This has interesting applications to symmetric hyperbolic systems of PDEs.

Degenerate matrices are characterized by the single equation  $\text{discr}[S] = 0$ , where  $\text{discr}[S]$  is the discriminant of  $S$ . I shall present a new proof of the proposition that the discriminant can be represented as a sum of squares.

Location: Kalkin 002

For more information e-mail [Meggan.Roberge@uvm.edu](mailto:Meggan.Roberge@uvm.edu) or call 802-656-4281