COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

Ellis R. Kolchin Memorial Lecture

David Eisenbud

University of California, Berkeley

"Vector Bundles and Free Resolutions"

Free resolutions of graded modules over polynomial rings are a way of generalizing the solutions of a system of linear equations over a field. Their study was initiated by David Hilbert as a way of obtaining invariants of projective algebraic varieties. Vector Bundles on projective spaces are a different way of encoding the solution of systems of linear equations with varying coefficients.
A group of remarkable conjectures about free resolutions by Boij and Soederberg in 2006 suggested a novel way of thinking about graded modules and set off a wave of activity. The conjectures have now been proven, and themselves greatly extended. The proofs have led, among other things, to a still mysterious duality between a description of the numerical invariants that are possible for the free resolution of a graded module on one side, and the numerical invariants of the cohomology of a vector bundle on projective space on the other. As a result we now have far more precise understanding of both these geometrically important objects.
I will try to give an accessible description of some of this new work, mostly through examples from elementary algebraic geometry.

Tuesday, April 20, 2010, 4:30 PM

Lehman Auditorium, 202 Altschul Hall, Barnard College (Enter at 117th Street & Broadway)

Tea will be served at 4:00 PM

508 Mathematics Hall, Columbia University

(Enter at 117th Street & Broadway)