



UNIVERSITY OF ROCHESTER

# Department of Mathematics Colloquium Series

## ABSTRACT

Most proofs in mathematics are still done using pen and paper. The Four-Color Theorem, which states that any map in a plane can be colored using just four colors, is one of the most famous mathematical problems solved using a computer (by Appel and Haken in 1978). In 1998, the speaker, also using a computer, solved the nearly 400-year-old Kepler Conjecture, which asserts that the optimal way to pack spheres is the so-called face-centered cubic packing (which is the way oranges are stacked at the fruit stand).

Last year, Gonthier found a noncomputer-aided proof of the Four-Color Theorem. This means the proof has now been carefully checked at the level of fundamental axioms and rules of inference of mathematics. The speaker will describe this project and explain some connections with the speaker's current work on packing spheres.

The talk is addressed to a broad audience with interest in mathematics.

Professor Thomas Hales

Winner of the Chauvenet Prize (MAA, 2003)

Department of Mathematics  
University of Pittsburgh

*Formal Proofs, the Four-Color Theorem, and  
the Kepler Conjecture for Sphere Packings*

Thursday, December 8, 3:30–4:30 p.m.  
Hoyt Auditorium

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