2009 Kieval Lecture Series Talks

Featuring

David Pengelley

from

Las Cruces, New Mexico

Thursday, May 14, 1:00 p.m. "Did Euclid Need the Euclidean Algorithm to Prove Unique Factorization?" in Taylor 28/31

Euclid proved the key to uniqueness of prime factorization for natural numbers; if a prime divides the product of two numbers, then it divides one of them. Or did he? We investigate a subtle gap in Euclid's proof, running into misconceptions about the relationship between Eudoxean proportions of magnitudes and the earlier Pythagorean proportions of whole numbers. We will show how to make Euclid's proof good after 2300 years.

Friday, May 15, 11:00 a.m. "Dances Between Continuous and Discrete: Euler's Summation Formula" in Taylor 28/31

Leonhard Euler developed his famous summation formula to estimate the sum of the reciprocal squares to 14 digits, spurring his spectacular guess and proof that this sum is exactly one sixth the square of pi. Subsequently he connected his summation formula to Bernoulli numbers and many other topics, masterfully circumventing that it almost always diverges. I will show Euler's idea for deriving his summation formula, and how he applied it to estimate the sum of reciprocal squares, and also sums of logarithms, thereby calculating large factorials (Stirling's series) with ease.

Friday, May 15, 3:00 p.m. "Voici ce que j'ai trouv\'e (Here is What I Have Found): Sophie Germain's Grand Plan for Proving Fermat's Last Theorem" in SCIENCE 118

Sophie Germain (1776-1831) is the first woman known to have created important mathematical research. Although barred from universities, she managed to engage the world's top mathematicians, initially through male impersonation. Our recent discoveries in Germain's manuscripts reveal that she pursued an unknown grand plan to prove outright the famous claim of Pierre de Fermat, today known as Fermat's Last Theorem. We will explore Germain's situation and her grand plan, and argue for a substantial elevation of her stature as a number theorist. No prior mathematical knowledge is required of the audience.

David Pengelley was raised in Canada and the U.S., punctuated by immersion in the German boarding school Die Odenwaldschule. His B.S. is from the University of California, Santa Cruz, and Ph.D. from the University of Washington, including a year at Oxford University unsuccessfully trailing his thesis advisor, Doug Ravenel, around the world. After a M.I.T. Moore Instructorship he came to New Mexico State University.

David seems to continue increasing the number of hats he wears, collaborating in communities of which he may be the only intersection point. He continues longtime research in algebraic topology, on the structure over the Steenrod and Kudo-Araki-May algebras of the homology and cohomology of classifying spaces for various types of vector bundles, and connections to invariant theory. This has been supplemented by developing the pedagogies of teaching with student projects, and with primary historical sources, and most recently with both rolled into one. And he has developed a mathematics education graduate course on the role of history in teaching mathematics. To David's great surprise, teaching with primary sources has led to research in history, including two decades marinated in Sophie Germain's nineteenth century manuscripts on Fermat's Last Theorem, and a potential addiction to exposing Leonhard Euler. More on these eclectic pursuits is at www.math.nmsu.edu/~davidp.

In January 2009 David received the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics, from the Mathematical Association of America.

David loves backpacking and wilderness, is active on environmental issues, and has become a fanatical player with the NMSU Badminton Club. His sister lives in Ashland.