

Archived Colloquia

2009/10

September 25, 2009: Michael Dorff (Brigham Young University)

Title: *Shortest Paths, Soap Films, and the Shape of the Universe* ([Flyer](#))

Abstract: In high school geometry we learn that the shortest path between two points is a line. In this talk we will explore this idea in several different settings. First, we will apply this idea to finding the shortest path connecting more than two points. Then we will move this idea up a dimension and look at a few equivalent ideas in terms of surfaces in 3-dimensional space. Surprisingly, these first two settings are connected through soap films that result when a wire frame is dipped into soap solution. We will use a hands-on approach to look at the geometry of some specific soap films or "minimal surfaces". The idea of surfaces in 3-dimensional space will be applied to tic-tac-toe in higher dimensions. And then all of this will lead us to a discussion about the shape of the universe.

October 9, 2009: Sam Nelson (Claremont McKenna College)

Title: *The Combinatorial Revolution in Knot Theory* ([Flyer](#))

Abstract: Much as our concept of 'number' has evolved over time, what we mean by 'knots' has recently undergone its own evolutionary generalization. We will explore new types of generalized knots including virtual knots, singular knots, flat virtual knots and more. These new knot types motivate related algebraic structures such as kei, quandles, racks and biquandles. This talk is based on an article scheduled to appear in Notices of the AMS in 2010.

December 4, 2009: Ed Pegg Jr. (Wolfram)

Title: *Fun with Numb3rs - The Amazing Entertainment of Recreational Mathematics* ([Flyer](#))

Abstract: How can you draw an ellipse that is tangent to the three midpoints of an arbitrary triangle? Marden's theorem provides a simple answer. Place the triangle in the complex plane, make a polynomial from the three corners, and take the derivative. Ed Pegg Jr. will discuss and demonstrate this piece of recreational mathematics, along with several dozen others. Time permitting, he will also discuss his 6 years of math consulting for the Numb3rs television show.

April 9, 2010: John Baez (UC Riverside)

Title: *Physics, Topology, Logic and Computation: A Rosetta Stone* ([Flyer](#))

Abstract: In particle physics, Feynman diagrams are used to reason about quantum processes. Similar diagrams can be used to reason about logic, where they represent proofs, and computation, where they represent programs. With the rise of interest in quantum cryptog-

raphy and quantum computation, the explanation became clear: there is extensive network of analogies between physics, topology, logic and computation. In this introductory talk I, will make some of these analogies precise using a wonderfully general branch of mathematics called category theory.