UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Mathematics

Calendar of Events For the Week of January 26th – 30th, 2015

**MONDAY, 26th**
4:10-5:30PM, SURGE 268  |  NETWORK THEORY  |  Dr. John Baez
4:10-5:00PM, SURGE 284  |  MATH CLUB  |  Dr. Kevin Costello, UC Riverside
                            |  Viewing: “N is a Number”

**TUESDAY, 27th**
9:40-11:00AM, SURGE 284  |  ALGEBRAIC GEOMETRY  |  Dr. Ziv Ran
11:10AM-12:00PM, SURGE 268  |  TOPOLOGY  |  Dr. Julie Bergner
                                |  TBA
1:00-2:00PM, SURGE 284  |  LIE THEORY  |  Dr. Vyjayanthi Chari

**WEDNESDAY, 28th**
11:10AM-12:00PM, SURGE 268  |  COMBINATORIAL NUMBER THEORY  |  Dr. Mei-Chu Chang
11:10AM-12:00PM, SURGE 284  |  PDE & APPLIED MATHEMATICS  |  Dr. Gang Xu, Jiangsu University
                                |  “On the instability problems of transonic conic shocks and transonic oblique shocks”
12:10-1:00PM, SURGE 277  |  FLUIDS  |  Dr. Jim Kelliher
3:40-5:00PM, SURGE 284  |  COLLOQUIUM  |  Dr. Yulong Xing, Oak Ridge National Laboratory
                                |  “Finite element discontinuous Galerkin methods for wavepropagation problems”

**THURSDAY, 29th**
11:10-12:30PM, SURGE 268  |  FRACTAL RESEARCH GROUP  |  Jared Tromantano
                                |  "Fuzzy Structures with Applications to Differential Topology and Manifold Learning”
1:00-2:00PM, SURGE 284  |  LIE THEORY  |  Dr. Vyjayanthi Chari
*3:40-5:00PM, SURGE 284  |  COLLOQUIUM  |  Dr. David Weisbart, UC Los Angeles
                                |  2 part talk – see flyer for titles/abstracts
3:40-5:00PM, SURGE 268  |  MATHEMATICAL PHYSICS & DYNAMICAL SYSTEMS  |  Leo Vu
                                |  TBA

**FRIDAY, 30th**
11:10AM-12:00PM, SURGE 268  |  DIFFERENTIAL GEOMETRY  |  Dr. Zhang-dan Guan, UC Riverside
                                |  “Holomorphic Symplectic Structures, Massey Products and Nonformality 1”
1:10-2:00PM, SURGE 284  |  GRAD STUDENT SEMINAR  |  Xander Henderson, UC Riverside
                                |  “On the Assouad dimension of self-similar sets with overlaps”
3:10-4:00PM, SURGE 268  |  COMMUTATIVE ALGEBRA  |  Dr. David Rush
Monday, January 26th, 4:10 - 5:00 p.m.

In Surge 284

Viewing of “N is a Number”

This week in math club we'll be watching the film "N is a Number", which is a documentary in the life of Paul Erdos. Erdos was one of the most prolific and unusual mathematicians of the 20th century, and essentially spent the last few decades of his life as a nomad without a permanent home or job. Instead, he spent his life traveling between collaborators and visits: A week here, a week there, and over a thousand papers written by his 1996 death.

Snacks and drinks served!

mathdept.ucr.edu/mathclub.html
Abstract:

In this talk, we are concerned with instability of a steady transonic shock wave for the perturbed hypersonic flow past an infinitely long cone or 3D wedge. Theoretically, as indicated in classic book -- "Supersonic flow and shock", it follows from the Rankine-Hugoniot conditions and the entropy condition that there will appear a weak shock or a strong shock attached at the vertex of the cone or sharp wedge in terms of the different pressure states at infinity behind the shock surface, which correspond to the supersonic shock and the transonic shock respectively. But a longstanding open problem is that, only the weak shock could occur, and the strong one is unstable. However, a convincing proof of this instability has apparently never been given.
Abstract:

The Assouad dimension of a set is of interest as it provides information about the local complexity of the set. Unfortunately, direct computation of the Assouad dimension is often quite difficult. In this talk, I will show that if a self-similar set satisfies the weak separation property (WSP), then the Assouad dimension coincides with the easily computed similarity dimension. Moreover, if the WSP is not satisfied, then the Assouad dimension is bounded below by 1, giving a precise dichotomy for subsets of the real line.

Friday, January 30th, 2015
Surge 284
1:10 – 2:00 p.m.
Wave propagation problems arise in a wide range of applications. In this presentation, we will present and analyze finite element discontinuous Galerkin (DG) methods for two types of wave problems. In the first part of the talk, we consider the nonlinear shallow-water wave equations with a non-flat bottom topography, which have been widely used to model flows in rivers and coastal areas. Since the equations admit non-trivial steady-state solutions, extra care need to be taken to approximate the source term numerically. We will talk about recently developed high-order DG methods, which can capture the steady state well, and at the same time are positivity preserving without loss of mass conservation. In the second part, we will present energy conserving DG methods for the nonlinear dispersive Korteweg-de Vries (KdV) equation, which preserve the first two invariants (the integral and L2 norm) of the numerical approximations. Numerical results show that this property imparts the approximations with beneficial attributes such as more faithful reproduction of the amplitude and phase of traveling wave solutions. Extension to other wave propagation problems will be discussed at the end.
The study of non-archimedean analogues of physical theories was originally motivated by the apparent breakdown of the geometry of spacetime below the Planck scale. We can formulate physical theories in, for example, a $p$-adic setting by analogy to the real setting. The question is: Do analogous theories have analogous features? We will consider some examples of analogous features in the theory of finite approximations of quantum systems, in the study of diffusion, and in the classification of elementary particles.

Adopting a culture of inclusion and cooperation will markedly improve student learning and growth. We will discuss the benefits of collaborative learning and some advances in technology that make it possible to create successful collaborative learning environments in large lectures and in online courses.