Possible Senior Thesis Advisors

The following faculty have expressed an interest in advising a Senior Thesis. Many of them have specific topics in mind that are described briefly below

- **Frank Connolly:** Geometric Topology, Characteristic Classes, Riemannian Geometry, Algebraic Number Theory, Lie Groups, Complex Algebraic Curves, Morse theory.

- **Jeff Diller:** Complex analysis. Dynamical systems.

- **Sam Evens:** Algebra, Number Theory, Group Theory and Representation theory and related subjects (combinatorics, physics, etc).

- **David Galvin:** Topics in graph theory/combinatorics.

- **Brian Hall:** Mathematical physics, Lie groups, quantum mechanics, representation theory, spectral theory

- **Qing Han** Possible Topics: Structure and size of some special sets in line or plane. These sets include Cantor sets, snowflakes, and Sierpinski gaskets.

- **Alex Himonas:** My area of expertise is Partial Differential Equations and Applications, and I am available for supervising research at both the undergraduate and graduate level.

- **Richard Hind:** A Legendrian knot is an embedding

$$\gamma = (x(t), y(t), z(t)) : S^1 \to R^3$$

satisfying $z' = yx'$, for example $\gamma = (\cos t, \sin 2t, \frac{-2}{3} \sin 3t)$. These can be studied using the wavefront projection to the xz-plane. This is a cusp-curve without vertical tangencies and γ can be reconstructed from the projection by setting $y = \frac{dz}{dx}$. We would like to classify Legendrian knots up to deformation .

- **Julia Knight:** My area is logic—computability and computable structure theory. Before mentioning particular topics, I would rather talk with a student who is considering working with me. I want to see what has caught the student's interest and what the student has studied or read that might be relevant.

- **François Ledrappier:** Ergodic theory.

- **Liviu Nicolaescu:** geometric probability, random series, spectra of random matrices, Markov chains and random walks, distributions and their applications.

- **Claudia Polini:** Curve singularities, defining equations of Rees algebras, cores of monomial ideals and integrality. (I have some interesting problems that a good undergraduate student can approach in commutative algebra with a view towards Algebraic Geometry).

- **Roxana Smarandache:** Properties of Bethe permanents of matrices: approximating permanents of matrices (permanents are like determinants but the addition is without the alternating sign); LDPC codes (kernels of sparse 0-1 matrices): algebraic and combinatorial approaches; Algebraic combinatorics and graph theory: distance bounds of codes from eigenvalues of the adjacency matrix etc.

- **Brian Smyth:** 1.New results in elasticity via geometry. 2. Classification of constant mean curvature surfaces with continuous symmetry. 3. The movement of plane curves by curvature.

- **Dennis Snow:** Complex Analysis, algebraic geometry, Lie groups and algebras, topics related to computer algorithms and programming, coding theory.

- **Nancy Stanton:**

  - Complex analysis
    * Riemann surfaces
    * Elementary several complex variables
    * Normal families, with applications to Fatou–Bieberbach examples or dynamical systems
  - Differential geometry
    * Minimal surfaces
    * Surfaces of constant mean curvature
  - Partial differential equations
    * Can one hear the shape of a drum? and related problems
  - Fourier series
    * The Gibbs phenomenon and related phenomona
    * Related series
    * Fourier series in several variables

- **Bruce Williams:** Topology of manifolds.