# Research Areas

The five main areas of concentration are **Algebra**, **Analysis**, **Combinatorics**, **Geometry/Topology**, and **Statistics/Probability**.

**Algebraic and Geometric Topology**

- John Abou-Rached (VAP)
- Laura Anderson
- Michael Dobbins
- Ross Geoghegan (emeritus)
- Cary Malkiewich
- Pedro Ontaneda
- Lorenzo Ruffoni
- Jenya Sapir
- Daniel Studenmund
- Danika Van Niel (VAP)

**Algebra related to logic and computer science**

- Fernando Guzman (emeritus)

**Applied and Computational Mathematics**

- Emmanuel Adara
- Minghao Rostami
- Ziyao Xu

**Arithmetic Algebraic Geometry**

- Huy Dang
- Alexander Borisov
- Adrian Vasiu

**Graph Theory**

- Quaid Iqbal (VAP)
- Tan Nhat Tran (VAP)
- Thomas Zaslavsky

**Group Theory**

- Benjamin Brewster (emeritus)
- Robert Bieri (visiting)
- Matthew Brin (emeritus)
- Walter Carlip (visiting)
- Ross Geoghegan (emeritus)
- Fernando Guzman (emeritus)
- Luise-Charlotte Kappe (emeritus)
- Tae Young Lee (VAP)
- Marcin Mazur
- Daniel Studenmund
- Inna Sysoeva (visiting)
- Hung Tong-Viet

**Machine Learning**

- Zeyu Ding (courtesy)
- Guifang Fu
- Xingye Qiao
- Minjie Wang

**Number Theory**

- Alexander Borisov
- Walter Carlip (visiting)

### Combinatorial Geometry

- Laura Anderson
- Alexander Borisov
- Michael Dobbins
- Tan Nhat Tran (VAP)
- Thomas Zaslavsky

### Combinatorics

- Laura Anderson
- Michael Dobbins
- Quaid Iqbal (VAP)
- William Kazmierczak
- Tan Nhat Tran (VAP)
- Thomas Zaslavsky

### Geometric Analysis

- Paul Loya
- Pedro Ontaneda
- Emmett Wyman
- Xiangjin Xu
- Gang Zhou

### Geometric Group Theory

- John Abou-Rached (VAP)
- Matthew Brin (emeritus)
- Ross Geoghegan (emeritus)
- Fernando Guzman (emeritus)
- James Hyde
- Lorenzo Ruffoni
- Jenya Sapir
- Daniel Studenmund

### Geometry of Manifolds

- Huy Dang
- Luise-Charlotte Kappe (emeritus)
- Marcin Mazur
- Adrian Vasiu

### Partial Differential Equations

- Paul Loya
- Emmett Wyman
- Xiangjin Xu
- Gang Zhou

### Probability

- Vladislav Kargin
- David Renfrew
- Rohan Sarkar
- Anton Schick
- Gang Zhou

### Representation Theory

- Alex Feingold
- Dikran Karagueuzian
- Tae Young Lee (VAP)
- Inna Sysoeva (visiting)
- Hung Tong-Viet

### Statistics

- Mei-Hsiu Chen (director of consulting)
- Guifang Fu
- Vladislav Kargin
- Pratik Misra
- Jingchen (Monika) Hu
- Aleksey Polunchenko
- Xingye Qiao

- Pedro Ontaneda
- Lorenzo Ruffoni
- Anton Schick
- Minjie Wang
- Qiqing Yu

**John Abou-Rached** - Robert Riley Visiting Assistant Professor
**Areas of Interest:** Dynamical systems, Geometry, and Number theory
**Description:** I study dynamics on moduli space and homogeneous dynamics, with a most recent focus on obtaining quantitative equidistribution results in new settings. Applications are to geometry and number theory.

**Emmanuel Adara** - Robert Riley Visiting Assistant Professor
**Areas of Interest:**
**Description:** My research focuses on the development of efficient computational methods for modeling the stochastic dynamics of biochemical systems. I work with the Chemical Master Equation (CME) and the Reaction-Diffusion Master Equation (RDME) to capture molecular-level fluctuations and spatial dynamics within reaction networks. To address the computational challenges posed by these systems, I employ techniques such as the method of moments combined with maximum entropy reconstruction and adaptive Quantized Tensor Train (QTT) decompositions for managing high-dimensional models. Additionally, I integrate machine learning approaches to emulate stochastic simulations, enabling accurate and reusable predictions of system behavior.

**Laura Anderson** - Associate Professor
**Areas of Interest:** Combinatorics, Topology
**Description:** My research focuses on interactions between combinatorics and topology, particularly those involving oriented matroids, convex polytopes, and other concepts from discrete geometry. Much of my work involves combinatorial models for topological structures such as differential manifolds and vector bundles. The aims of such models include both combinatorial answers to topological questions (e.g., combinatorial formulas for characteristic classes), and topological methods for combinatorics (e.g. on topology of posets). I have also worked on applications of oriented matroids to data analysis in psychology.

**Robert Bieri** - Visiting Professor
**Areas of Interest:** Geometric, homological, combinatorial and asymptotic methods in group theory.
**Description:** My original interest in homological methods for infinite groups (cohomological dimension and Poincare duality for groups) shifted towards geometric and asymptotic methods. I analyze links between finiteness properties of groups and their modules to geometric and topological properties at infinity of G-spaces (e.g., the SIGMA-invariants which among other things provided a necessary conditions for finte presentability of G; but they also contributed a central polyhedrality result to the much later emerging Tropical Geometry). The focus was on familiar groups like metabelian, soluble, free and linear ones, or fundamental groups of 3-manifolds, but also Thompson's groups F, T and V.My most recent work started with the observation that Thurston's description of V can be interpreted in terms of rearranging the tiles of an ideal triangle-tessellation of the hyperbolic plane; then it analyzes the corresponding groups of rearrangements of the Euclidean tessellation Rn by unit cubes. This opens the door to new group theory related to more general Euclidean and hyperbolic tessellations.

**Alexander Borisov** - Associate Professor
**Areas of Interest:** Algebraic Geometry, Number Theory, Discrete Geometry
**Description:** My general research area is algebraic geometry and number theory, broadly interpreted. Particular topics of interest include birational geometry, toric geometry and convex discrete geometry, polynomial morphisms, integer polynomials, Arakelov geometry.

**Walter Carlip** - Visiting Associate Professor
**Areas of Interest:** Finite Group Theory, Number Theory
**Description:** My first love was the theory of finite groups. I worked with Prof. George Glauberman at the University of Chicago, where my thesis and early publications concerned regular orbits and the structure of solvable groups. I also worked with Prof. Glauberman on his revision (with Prof. Helmut Bender) of the Feit-Thompson Odd Order Theorem. More recently I have been interested in recursive sequences, working to complete a classification of second-order sequences and their stability. I have also studied pseudoprimes, Lucas d-pseudoprimes, and Carmichael-Lucas numbers. I have several publications on iteration graphs, and have a long-standing interest in computational algorithms both in number theory and algebra.

**Mei-Hsiu Chen** - Director of Statistical Consulting
**Areas of Interest:** Biostatistics, Statistics
**Description:** My initial research focuses on designing and conducting clinical trials in evaluating imaging as screening tools for cancers. After a long hiatus from research, my current research focuses on statistical education via statistical consultation in matching appropriate statistical methods with different objectives from various disciplines. My work includes uncovering racial biases in crimes and in public school disciplinary actions, and identifying the role of mechanobiology on endothelial to mesenchymal transformation.

**Huy Dang** - Allen Ziebur Visiting Assistant Professor
**Areas of Interest:**
**Description:** My research is in number theory and algebraic geometry, focusing on Galois covers of curves in characteristic p, particularly those with wild ramification. Such covers display intricate ramification behaviors that do not arise in characteristic zero, making them crucial for understanding arithmetic geometry in positive characteristic. I study their deformation and liftability to characteristic zero using tools from higher class field theory, non-archimedean geometry, and ramification theory. More recently, I've begun exploring connections with p-adic differential equations, which provide new insights into the degeneration of wildly ramified covers.

**Zeyu Ding** - Assistant Professor (by courtesy)
**Areas of Interest:** Data privacy, statistical disclosure control, formal methods, machine learning
**Description:** My research lies in the intersection of data privacy, statistical disclosure control, formal methods and machine learning. The overarching goal of my work is to protect sensitive personal information from being leaked in unintended ways. My current research focuses on differential privacy and its interactions with formal verification, numerical optimization, privacy-preserving statistical inference and machine learning.

**Michael Dobbins** - Associate Professor
**Areas of Interest:** Convex polytopes, oriented matroids, topological methods in discrete geometry, the existential theory of the reals, and computational complexity
**Description:** Recently I have been focused on combinatorial and topological analogs of geometric objects, and circumventing some challenges of real algebraic geometry. In particular, I have constructed a classifying space for vector bundles from topological representations of oriented matroids, and I am working on extending these results.

**Alex Feingold** - Professor
**Areas of Interest:** Algebra, Lie algebras and their representations, conformal field theory, piecewise isometry groups
**Description:** Finite dimensional semisimple Lie algebras, tensor product decomposition of irreducible modules, representation theory of the infinite dimensional Kac-Moody Lie algebras, bosonic and fermionic creation and

annihilation operators, affine and hyperbolic Kac-Moody algebras, topics in combinatorics, power series identities, modular forms and functions, Siegel modular forms, conformal field theory, string theory, and statistical mechanical models, vertex operator algebras, their modules and intertwining operators, the theory of fusion rules, Weyl groups of Kac-Moody Lie algebras, tessellations associated with Weyl groups, piecewise isometry groups defined from Weyl group tessellations.

**Guifang Fu** - Associate Professor
**Areas of Interest:** Biostatistics, Machine Learning, Ultrahigh-dimensional Variable/Feature Selection and Inference, Shape Analysis, Longitudinal/Functional Data Analysis, Biomedical Applications
**Description:** My main focus is to develop advanced statistical models and computational methodologies to unravel the genetic and environmental mechanisms that regulate complex biological traits, including morphology/shape, biomedical problems and disease. I am particularly interested in high-dimensional, "big data" modeling, and functional data analysis. My genetic leaf shape project was awarded a three-year NSF grant. I enjoy collaborating on interdisciplinary projects, working with researchers from the application domains and addressing real-life data analysis questions.

**Jingchen (Monika) Hu** - Associate Professor
**Areas of Interest:**
**Description:** My scholarship research interests lie in statistical data privacy, in particular through the use of generating synthetic data from statistical models for public release. I mostly work on Bayesian methodology for statistical data privacy applications, as well as differential privacy methods. My education research focuses on advancing Bayesian education for students, especially at the undergraduate level.

**James Hyde** - Assistant Professor
**Areas of Interest:** Groups of homeomorphisms and the properties of simplicity, finite generation, finite presentation and (left)-orderability
**Description:** I work broadly in the area of geometric group theory. Some of my work involves constructing examples of groups with novel combinations of properties. I'm also interested in the Boone-Higman Conjecture and variants of finite generation.

**Quaid Iqbal** - Robert Riley Visiting Assistant Professor
**Areas of Interest:** Combinatorics, Spectral Graph Theory
**Description:** My area of research is in algebraic graph theory and combinatorics, especially, distance regular graphs and its complete characterization with fixed parameters. I am interested in complete characterization of distance regular graphs by its Intersection number, fixed eigenvalue, fixed diameter, and valency (Regularity). Currently, I am working that when a distance-i graph has fever eigenvalues? I worked on the characterization of distance regular graphs with diameter 3, whose distance-2 graph is strongly regular. Recently, With Prof. Thomas Zaslavsky also working on strongly regular signed graphs. I am also interested in the existence and non-existence problems of a graph.

**Dikran Karagueuzian** - Associate Professor
**Areas of Interest:** Algebraic topology, representation theory, group cohomology
**Description:** The Brent-Pollard Heuristic, used in factorization algorithms and elliptic curve cryptography, is the principle that polynomial functions on finite fields are similar to random maps. Using Galois Theory and Representation Theory, it is possible to prove theorems that make this heuristic more precise. I supervise a PhD student who is building models for a financial product: self-refinancing mortgages. I also manage a team of undergraduate researchers attempting to solve a deterministic financial game using reinforcement learning.

**Vladislav Kargin** - Associate Professor
**Areas of Interest:** Probability, Statistics
**Description:** My research focuses on probability theory, with much of my work centered on random matrices and free probability. I am also interested in applying probability theory to the analysis of large datasets, statistical

physics, and combinatorics.

**Tae Young Lee** - Robert Riley Visiting Assistant Professor
**Areas of Interest:** Finite groups and their representation theory
**Description:** I am interested in finite (or sometimes algebraic) groups, their representations, and connections to other topics in mathematics. My last few papers were about local systems (continuous representations of étale fundamental groups) and their monodromy groups (the images of these representations). I classified a specific kind of local systems, called hypergeometric sheaves, when they have specific type of finite monodromy groups, using representation theory of these groups and some number theoretic method. I am also working on problems about characters of finite symmetric groups. I would be also happy to discuss general problems about finite groups and their representations, or even some problems in discrete mathematics with algebraic points of view.

**Paul Loya** - Associate Professor
**Areas of Interest:** Global and geometric analysis, Elliptic theory of differential operators on manifolds with singularities, Partial differential equations, General Relativity
**Description:** The underlying theme of my research is the investigation of topological, geometric, and spectral invariants of (singular) Riemannian manifolds using techniques from partial differential equations. For example, the Euler characteristic of a surface is a topological invariant based its usual definition in terms of a triangulation of the surface. However, it may also be considered geometric in view of the Gauss-Bonnet theorem or spectral in view of the Hodge theorem. I am interested in such relationships on general singular Riemannian manifolds.

**Cary Malkiewich** - Associate Professor
**Areas of Interest:** Algebraic topology, especially stable homotopy theory, algebraic K-theory, applications to manifolds and cell complexes.
**Description:** My primary research area is algebraic topology. I like to apply stable homotopy theory (spectra) to questions about manifolds and cell complexes. My work has taken a recent turn towards scissors congruence: in 2022 I proved that it is described by a Thom spectrum, and I am developing the consequences of this surprising result for the higher scissors congruence groups.

**Marcin Mazur** - Professor
**Areas of Interest:** Algebraic number theory, group theory
**Description:** My research interests concentrate around areas where number theory and group theory intersect. Topics of particular interest are group rings, group schemes over rings of algebraic integers, Galois module structures and Galois representations.

**Ryan McCulloch** - Visiting Associate Professor
**Areas of Interest:** Group theory, combinatorics
**Description:** My research interests are in general group theory, finite group theory, and related structures such as lattices of subgroups of a group. I am also interested in combinatorics, and have recently been looking at relationships between designs and other combinatorial objects.

**Pratik Misra** - Assistant Professor
**Areas of Interest:**
**Description:** My research interest is in the relatively new area of algebraic statistics where we use concepts from algebra and combinatorics to address statistical and causal inference challenges. More specifically, I work on graphical models where I am interested in answering algebraic questions like obtaining the defining equations of the model, and statistical questions like structural and parameter identifiability.

**Pedro Ontaneda** - Distinguished Professor
**Areas of Interest:** Topology and differential geometry
**Description:** My general interest is the geometry and topology of aspherical spaces. I have done some work in the study of the relationship between exotic structures and (negative, non-positive) curvature, and its applications

to the limitations of PDE methods in geometry. Other interests: geometric group theory, K-theory, mechanics.

**Aleksey Polunchenko** - Associate Professor
**Areas of Interest:** Statistics, sequential analysis.
**Description:** Mathematical statistics and specifically the problem of sequential (quickest) change-point detection, currently focusing on the case of composite hypotheses.

**Xingye Qiao** - Professor and Chair
**Areas of Interest:** Statistics, machine learning, causal inference
**Description:** My research interests encompass statistics, machine learning, and data science. I develop and analyze predictive and inferential tools for complex data problems such as imbalanced classes, high-dimensional data, transfer learning, and observational studies. My focus is on designing theoretically sound and efficient learning algorithms that address sample, time, and space complexity challenges. I aim to enhance the trustworthiness and reliability of statistics and machine learning methods, particularly in critical domains like healthcare. My work includes developing user-friendly prediction tools with built-in confidence measures and methods for individualized estimation, prediction, and recommendation from observational and interventional data.

**David Renfrew** - Associate Professor
**Areas of Interest:** Probability, Random Matrix
**Description:** My research lies in Probability and Random Matrices. I am particularly interested in non-Hermitian random matrices and the interplay between random matrices and free probability. I am also interested in applications to biologic systems.

**Minghao Rostami** - Associate Professor
**Areas of Interest:** Computational fluid dynamics, numerical methods, and mathematical biology
**Description:** My research interests lie in numerical methods for differential equations and large matrices, especially the ones arising from computational fluid dynamics. I am also interested in data-driven approaches for these problems. Although I primarily conduct experiments and simulations on a computer with the aid of scientific computing software, I have a wet lab for measuring and visualizing fluid flows using techniques such as Particle Image Velocimetry (PIV).

**Lorenzo Ruffoni** - Assistant Professor
**Areas of Interest:** Algebraic and Geometric Topology, Geometry of Manifolds, Geometric Group Theory
**Description:** I am interested in Geometry and Topology, and in particular: geometric group theory, geometric structures on manifolds and cell complexes.

**Eugenia Sapir** - Associate Professor
**Areas of Interest:** Low dimensional topology, geometric topology, geometric group theory, dynamics
**Description:** I work in geometric topology, combining tools from geometry, geometric group theory and dynamics, as well as combinatorial techniques, to study various structures on Riemann surfaces of negative Euler characteristic. Primarily, I am interested in various counting problems for closed curves, and in the geometry of the space of geodesic currents, which is a space that contains many of the important objects of study.

**Rohan Sarkar** - Robert Riley Visiting Assistant Professor
**Areas of Interest:**
**Description:** My research lies at the intersection of Probability, Analysis, and Geometry. In particular, I study spectral theory and functional inequalities for Markov processes generated by non-self-adjoint, non-local operators. My work also explores functional analytic aspects of Markov processes on sub-Riemannian manifolds. In this vein, I am especially interested in understanding the potential theory associated with hypoelliptic operators, particularly in the sub-Riemannian setting.

**Anton Schick** - Bartle Professor

**Areas of Interest:** Statistics, probability
**Description:** Large sample theory in statistics, characterization and construction of asymptotically efficient estimators and tests for semiparametric and nonparametric models, statistical inference for Markov chains and stochastic processes, estimation and comparison of curves, the behavior of plug-in estimators, optimal inference for bivariate distributions with constraints on the marginal, modelling with incomplete data, empirical likelihood, and theory and application of finite and infinite order U-statistics.

**Daniel Studenmund** - Assistant Professor
**Areas of Interest:** Geometric group theory, discrete subgroups of Lie groups, group cohomology
**Description:** My research addresses questions arising at the intersection of geometric group theory and the study of discrete subgroups of Lie groups. I am particularly interested in invariants associated to the collection of finite-index subgroups of a given group G. One example is the abstract commensurator Comm(G), the group of all isomorphisms between finite-index subgroups of G, modulo equivalence. Other examples are growth rates of various functions associated to the collection of finite-index subgroups, which can be thought of as helping to "quantify" residual finiteness of G. I also study other invariants of groups, such as superrigidity and cohomology of arithmetic groups, using algebraic and geometric methods.

**Inna Sysoeva** - Visiting Researcher
**Areas of Interest:** Group Theory
**Description:** My main research area is group theory. More specifically, in the recent years I have been interested in braid groups and their representations.

**Hung Tong-Viet** - Professor
**Areas of Interest:** Representation theory and character theory of finite groups, permutation groups and abstract finite groups.
**Description:** My main research interests lie in the representation and character theory of finite groups, permutation groups and applications to number theory and combinatorics, and finite group theory in general. I am interested in studying groups or group structures using several important numerical invariants of the groups such as character degrees (ordinary and modular), p-parts of the degrees or character values such as zeros of characters. In permutation group theory, I study derangements, that is, permutations without fixed points, and their applications in number theory and graph theory, permutation characters and permutation polytopes. Recently, I am also interested in studying the influence of real conjugacy class sizes on the group structures.

**Tan Nhat Tran** - Robert Riley Visiting Assistant Professor
**Areas of Interest:** Algebraic Combinatorics, Hyperplane Arrangement
**Description:** I am dedicated to research in combinatorics, and especially its connections with commutative algebra, algebraic topology and probability theory. My research over the past few years has focused on the theory of arrangements of hyperplanes, especially how the combinatorial properties of hyperplane arrangements interact with the discrete geometric structures (e.g., graph, polytope, root system), topological objects (e.g., Poincaré polynomial, CW-complex), algebraic concepts (e.g., logarithmic derivation, Hopf algebra) and probabilistic models (e.g., expectation, vine copula).

**Danika Van Niel** - Robert Riley Visiting Assistant Professor
**Areas of Interest:** Algebraic topology, equivariant homotopy theory, equivariant algebra, algebraic K-theory, and homotopical combinatorics
**Description:** My primary research area is equivariant homotopy theory. I like to study equivariant analogues of algebraic objects and apply this knowledge to do computations. For example, part of my thesis work was on Mackey fields, an equivariant analogue of fields, which led to a new computation of another equivariant object called twisted topological Hochschild homology. I also study homotopical combinatorics, for this I use combinatorial objects such as transfer systems to study properties and structures within equivariant homotopy theory.

**Adrian Vasiu** - Professor

**Areas of Interest:** Arithmetic Algebraic Geometry

**Description:** My area of research is Arithmetic Algebraic Geometry, which is the common part of Number Theory, Algebra, and Geometry. I am very much interested in moduli spaces, group schemes, Lie algebras, formal group schemes, representation theory, cohomology theories, Galois theory, and the classification of projective, smooth, connected varieties. My research is focused on:

1. Shimura varieties of Hodge type (which are moduli spaces of polarized abelian varieties endowed with Hodge cycles),
2. arithmetic properties of abelian schemes,
3. classification of $p$-divisible groups,
4. representations of Lie algebras and reductive group schemes,
5. crystalline cohomology of large classes of polarized varieties,
6. Galois representations associated to abelian varieties,
7. arithmetic aspects over finite fields such as Waring problem for matrices and approaches to Jacobian Conjecture,
8. arithmetics properties of special classes of rings such as Hermite rings, and
9. arithmetic properties of affine algebraic geometry such as automorphisms of affine spaces and Jacobian Conjecture.

**Minjie Wang** - Assistant Professor

**Areas of Interest:** Statistics, machine learning, graphical models, data integration, high-dimensional statistics, variable selection

**Description:** I am interested in developing novel statistical machine learning methods to help scientists make data-driven discoveries from large-scale and complex data. My research interests include causal discovery, graphical models, data integration, high-dimensional statistics, and variable selection. My methodological research is driven by the goal of solving real-world problems, including biomedical and neuroscience applications.

**Emmett Wyman** - Assistant Professor

**Areas of Interest:** Spectral asymptotics, spectral geometry, Fourier integral operators

**Description:** I study Laplace-Beltrami eigenfunctions of large eigenvalue and how their asymptotics relate to the geometric or dynamical structure of the space in which they live. This area is related to classical and quantum physics and number theory.

**Xiangjin Xu** - Associate Professor

**Areas of Interest:** Harmonic Analysis and PDEs

**Description:**

- **I. Harmonic Analysis on Manifolds:** the spectral theory of elliptic operators (Laplace operator and Schrödinger operator) on compact or complete manifolds, in particular, on the growth estimates ($L^p$, bilinear, and gradient estimates) of eigenfunctions, multiplier problems, Carleson measures and Logvinenko-Sereda sets on compact or complete manifolds with or without boundary.
- **II. Geometric PDEs:** Li-Yau and Hamilton type gradient estimates, sharp estimates for the heat kernel and the Green's function for heat equations and Schrödinger operators on Riemannian manifolds (Finsler manifolds, metric measure spaces). Gradient estimates, Liouville's Theorems and entropy formulae for linear and nonlinear (possible degenerate) parabolic equations. Control theoretic problems for (linear and nonlinear) parabolic and hyperbolic PDE systems on manifolds via Carleman estimates. Periodic solutions, subharmonics and homoclinic orbits of Hamiltonian systems.

**Ziyao Xu** - Assistant Professor
**Areas of Interest:**
**Description:** My research interests lie in scientific computing and numerical analysis of partial differential equations (PDEs), with a focus on developing robust and efficient high-order numerical methods for PDEs arising from flow and transport problems. I have worked in computational fluid dynamics and fluid flow in porous media, particularly in designing high-order accurate finite element and finite difference methods. My work also encompasses mathematical modeling in these areas.

**Qiqing Yu** - Professor
**Areas of Interest:** Statistics
**Description:** My research interests are mainly in three fields.

1. Survival analysis. Since 1987, I have been working in this field, in particular on modeling the interval censored data, studying consistency and asymptotic normality of the generalized maximum likelihood estimator (MLE) of survival function or the semi-parametric estimator under linear regression model.
2. Statistical decision theory. My thesis was on admissibility and minimaxity of the best invariant estimator of a distribution function.
3. Probability model and computing methods for pattern recognition in the Genome project.

**Thomas Zaslavsky** - Professor
**Areas of Interest:** Combinatorics, graph theory
**Description:** My research is in combinatorics, especially matroids and their connections with combinatorial geometry and graph theory. The main topic of my work is signed, gain, and biased graphs. These are graphs with additional structure that leads to new graphical matroids and other new kinds of graph theory, such as colorings and geometrical representations, of which ordinary graphical matroids, colorings, etc., are special cases. In combinatorial geometry I work on arrangements of hyperplanes and lattice-point counting. Other research interests are in graph theory and in generalizing Sperner's theorem.

**Gang Zhou** - Associate Professor
**Areas of Interest:** Mathematical Physics, Geometric Analysis, and Probability
**Description:**
geometric analysis: mean curvature flow and Ricci flows by methods different from the classical ones, formation of singularities in finite time, flow through singularities.

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