WPI DEPARTMENT OF MATHEMATICAL SCIENCES

Week of March 2-6, 2020

Discrete Mathematics Seminar Series

Guillermo Carlo Nuñez
WPI

The joints problem and arithmetic sequences

ABSTRACT: A joint is a point in space where at least three lines meet. If we have L lines in $\mathbb{R}3$, how many joints can there be? Finding good estimates using arguments involving only points, lines and planes seems to be a hard problem. On the other hand using the polynomial method we can easily find better estimates. In this talk we will follow both approaches and discuss why the polynomial method does so well at this type of problem.

Wednesday, March 4, 2020
10:00AM-11:00AM
Stratton Hall 203

Financial Mathematics Seminar Series

Speaker
Affiliation

Title TBD

ABSTRACT: TBD

Tuesday, Month Day, 2019
4:00PM-5:00PM
Stratton Hall 203

Numerical Methods Seminar Series

Speaker
Affiliation

Title TBD

ABSTRACT: TBD

Thursday, Month Day, 2019
11:00AM-11:50 AM
Stratton Hall 203

Analysis and PDE Seminar Series

Samuel Z. Lin
Dartmouth College

Title TBD

ABSTRACT: The Laplace spectrum of a compact Riemannian manifold is defined as the set of eigenvalues of the corresponding Laplace operator. It is natural to ask: “how does the Laplace spectrum, a set of analytical data, relates to the geometry of the underlying manifold?” This is related to a famous question asked by Kac: “Can you hear the shape of a drum?” Inspired by Kac’s question, we call a geometric property audible if it is determined by the Laplace spectrum. While volume and dimension are audible, it is a well-established fact that the Laplace spectrum does not completely determine the geometry of the underlying manifold.

In this talk, we are particularly interested in the question of whether “local geometry” is audible among three-dimensional geometric structures. I will motivate this question and present our results in this direction. This is a joint work with Ben Schmidt and Craig Sutton.

Thursday, March 5, 2020
11:00AM-12:00PM
Stratton Hall 203

Colloquium

Peter E. Caines
McGill University

Graphon Mean Field Games: A Dynamical Equilibrium Theory for a Networked World

ABSTRACT: The complexity of large population multi-agent dynamical systems, such as occur in economics, communication systems, and environmental and transportation systems, makes centralized control infeasible and classical game theoretic solutions intractable.

In this talk we first present the Mean Field Game (MFG) theory of large population systems. Going to the infinite population limit, individual agent feedback strategies exist which yield Nash equilibria. These are given by the MFG equations consisting of (i) a Hamilton-Jacobi-Bellman equation generating the Nash values and the best response control actions, and (ii) a McKean-Vlasov-Fokker-Planck–Kolmogorov equation for the probability distribution of the states of the population, otherwise known as the mean field.

Next we shall introduce Graphon Mean Field Game and Control theory. Very large scale networks linking dynamical agents are now ubiquitous, with examples being given by electrical power grids and social media networks. In this setting, the emergence of the graphon theory of infinite networks has enabled the formulation of the Graphon Mean Field Game equations. Just as for MFG theory, it is the simplicity of the infinite population GMFG strategies which permits their application to otherwise intractable problems involving large populations and networks.

Friday, March 6, 2020
11:00AM - 12:00PM
Stratton Hall 203