

SSD 2018: Student Scholars Day

Department of Mathematical Sciences

Saturday, April 28, 2018

Short talks: 10:30 am to 11:30 am in 103a Walker Hall

Sydney Singleton, *College Football Recruiting Rankings and On-Field Performance*
Faculty mentor: Prof. Ross Gosky

Lindsey Wise, *Color-Recursive Visual Cryptography*

Bowen Jones, Sammy Pshyk, David Sawyer, Lauren Murray, Kelly Louck, Samantha Widman, Hannah Laws, Riley Ehlinger, Patrick Beekman, Skylar Yoder,
What I Learned at DataFest Faculty mentor: Prof. Alan Arnholt

Poster session: 1:00 pm to 1:50 pm on the third floor of Walker Hall

William Dulaney, *Analytic Solution to a Three-Level Optical Pumping System with Constant Coefficients*, Faculty mentor: Prof. Anthony Calamai

Ryan Hadenfeld, *The Effect of Skewness in Data on Time Series Regression Models*,
Faculty mentor: Prof. Joel Sanqui

Anthony Hengst, Isaac Medina Silver, Sergei Miles, Allison Staley,
RIG 2108: 2-colorings of K_5 , Faculty mentor: Prof. Jeff Hirst

Graduate talks: 2:00 pm to 4:30 pm in 103a Walker Hall

John Hall, *Free Leibniz Algebras*

Carter Murray, *Leibniz Algebras Generated By Two Elements*

Caleb Davis, *Reverse Mathematics and Hypergraph Coloring*

Russell Chamberlain, *Obscuring the Point: The Benefits of Points-free Grading in a Pointed World*

Dustin Roten, *Characterizing the Sensitivities of Atmospheric Models to Large FFCO₂ Point Source Parameters*

Abstracts of Graduate talks:

John Hall

Free Leibniz Algebras

The definitions and basic properties of Lie algebras and Leibniz algebras are discussed. A brief construction of the free Leibniz algebra is presented along with a fairly new result concerning free Leibniz algebras.

Carter Murray

Leibniz Algebras Generated By Two Elements

The notion of an object being cyclic is familiar in many areas of algebra including Leibniz algebras. This research will briefly examine the current research on cyclic Leibniz Algebras and present findings on Leibniz algebras generated by two elements. We examine bracket structures that allow for Leibniz algebras generated by two elements.

Caleb Davis

Reverse Mathematics and Hypergraph Coloring

Given a statement of hypergraph coloring, what are the set axioms required to prove it? Introducing Reverse Mathematics and the concepts of hypergraphs, the equivalence between Arithmetical Comprehension and a vertex coloring theorem will be discussed, as well as the difference from a result of graph coloring.

Russell Chamberlain

Obscuring the Point: The Benefits of Points-free Grading in a Pointed World

The history of points-grading and letter systems is newer and more varied than many realize. From their inception at Harvard, Yale, and Mount Holyoke, there have been concerns regarding what could be thought of in modern terms as performance over growth mindset. Alternatives to points-grading and letter systems are discussed; points-light and points free classroom designs are proposed in the context of this sometimes-contradictory history.

Dustin Roten

Characterizing the Sensitivities of Atmospheric Models to Large FFCO₂ Point Source Parameters

In order to mitigate the effects of global climate change, the greenhouse gas CO₂ is becoming the focus of many local, regional, and national environmental policies; therefore, to aid in the monitoring of this gas, it is crucial to accurately characterize its anthropogenic sources. To this end, statistically driven gridded emissions inventories (GEIs) have been developed using statistical methods and proxy datasets, such as the geolocations of large CO₂ point sources. Our work demonstrates how the exclusion of point source parameters in GEIs can change the distribution of atmospheric CO₂ in the modeling environment. Subsequently, these inaccurately generated distributions lead to weak correlations to satellite measurements. Specifically, we consider the inclusion/exclusion of stack height, stack diameter, and exhaust velocity at three large coal-fired power plants in the United States and quantify differences in CO₂ distribution under various modeling scenarios.