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Program: 2019 Undergraduate Mathematics Day

University of Dayton. Department of Mathematics

Undergraduate Mathematics Day

University of Dayton

Saturday, November 2, 2019

Undergraduate Mathematics Day
at the University of Dayton
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Program

8:45 – 9:30	Check In, Folder Pick-Up	Science Center Auditorium Lobby
9:30 – 10:50	Welcome Dr. Paul Benson Provost, University of Dayton Introduction Christian Hemsath, President University of Dayton's Chapter of Pi Mu Epsilon Invited Address: **Where Did All of the Numbers Go? Understanding and Succeeding in Math as MLLs – Mathematics Language Learners** Rachael Kenney, Purdue University	O'Leary Auditorium (MH 119)
10:50 – 11:15	Break	Science Center Auditorium Lobby and Atrium
11:15 – 12:10 (11:15-11:30) (11:35-11:50) (11:55-12:10)	Contributed Paper Sessions	Science Center 107, 108, 128, 146, 150
12:10 – 1:30	**Lunch**	Science Center Atrium
1:30 – 2:45	Introduction: Schraut Memorial Lecture Ben Wilson, President University of Dayton Math Club The Twentieth Annual Kenneth C. Schraut Memorial Lecture: **How do you Detect a Gerrymander?** Tommy Ratliff, Wheaton College	O'Leary Auditorium (MH 119)
2:45 – 3:15	Break	Science Center Auditorium Lobby and Atrium
3:15 – 4:10 (3:15-3:30) (3:35-3:50) (3:45-4:10)	Contributed Paper Sessions	Science Center 107, 108, 146, 150

Plenary Talks

O'Leary Auditorium, Miriam Hall, Rm 119

The 20th Annual Kenneth C.Schraut Memorial Lecture:
So How do you Detect a Gerrymander?

Dr. Tommy Ratliff
Wheaton College

Abstract: Partisan gerrymandering, or drawing district boundaries based primarily on party affiliation, has garnered a great deal of attention recently due to several high profile cases that have reached the United States Supreme Court. It is easy to look at some of the very oddly-shaped congressional districts that exist today and conclude that they must be gerrymandered. It is much more difficult to define clear criteria that detect excessive gerrymandering and that are compelling to the courts and public officials. In this talk we will see that this is not simply a geometric problem related to the shape of districts but that we must also consider the political geography of how voters are distributed within the state. We will also look at some promising approaches that have been developed in the last two years which use Markov Chain Monte Carlo sampling methods to build large ensembles of districting plans that can help determine if a specific districting plan is an extreme outlier.

Dr. Tommy Ratliff is Professor of Mathematics at Wheaton College in Norton, Massachusetts. He completed his PhD at Northwestern University in algebraic topology and held visiting positions at Kenyon College and St. Olaf College before moving to Wheaton in 1996. Most of his research falls within the general framework of Voting Theory, and he is particularly interested in the structure underlying electing committees. The design of these elections raises different issues from elections that pick a single winner since voters often have preferences for the overall composition of the committee that cannot be broken down into preferences for individual members. Most recently he has been concerned with mathematical questions related to redistricting and gerrymandering and has been involved with the Metric Geometry and Gerrymandering Group based at Tufts and MIT. He has also been active in the Mathematical Association of America, especially the Northeastern Section where he has served as both Chair and Governor of the Section. He has served in several faculty leadership roles at Wheaton, but all of his administrative experiences have reaffirmed his love of the classroom and that his true professional calling is helping undergraduates think deeply about interesting mathematics.

Plenary Talks (cont'd)

O'Leary Auditorium, Miriam Hall, Rm 119

Where Did All of the Numbers Go? Understanding and Succeeding in Math as MLLs - Mathematics Language Learner

Dr. Rachael Kenney
Purdue University

Abstract: Mathematics is considered a language in itself, composed of natural language and a symbolic system of mathematical signs, graphs, and diagrams. The learning of mathematics is heavily dependent on both the symbolic language of the discipline (including syntax and organization of symbols) and the natural language of instruction (including discourse practices specific to this discipline). Working fluently within the multiple semiotic systems of the language of mathematics requires developing strong symbol sense and connecting meanings of symbols to meanings in natural language. The symbolic tools that make mathematics so powerful are the very tools that often prevent learners from being successful in mathematics because they are not able to engage with the language in ways that are meaningful to them. As mathematicians, it is important to consider how can we make the language of mathematics more meaningful and accessible to all learners and users of mathematics. In this talk, we will discuss some of the wonders of the language of mathematics and consider reasons why mathematicians or mathematics teachers are able to interpret mathematics through its symbolic representations while novices often struggle as mathematics language learners (MLLs). We will discuss whether the claim that mathematics is a universal language makes sense, particularly when working with English language learners in mathematics, and we will examine frameworks for symbol sense in mathematics.

Dr. Rachael Kenney is an Associate Professor of Mathematics Education at Purdue University. She holds a joint appointment in the Department of Mathematics and Department of Curriculum and Instruction. Dr. Kenneys research focuses on issues related to teachers use of formative assessment and differentiation and students and teachers interactions with an reflections on mathematical symbols, language and representation. She has worked on research projects with colleagues in Engineering, Computer Science, Gifted Education, and ELL education, all focused on understanding learning in mathematics. Dr. Kenney has the opportunity to teach both mathematics classes for math majors and education courses for those planning to be middle or high school math teachers (i.e. preservice teachers). In both situations, she approaches teaching with the beliefs that students are active learners who need opportunities to construct their own understanding of concepts and connect them to personal experiences and prior knowledge. Her goals for both teaching and research include providing opportunities for teachers, students, and teacher educators to broaden their perspectives of what it means to do and to teach mathematics, and engaging all learners as reflective developers of their own knowledge. Dr. Kenney has been a Co-PI on multiple grants, including an NSF TUES grant, and has served on the advisory board of three STEM focused NSF grants. She has presented her work in national and international conferences around the world and has led professional development workshops for teachers in several states and abroad in a project with teachers of students with gifts and talents in Kuwait. She is a member of the Teaching Academy at Purdue and sits on its Executive Board, and she has received several teaching awards at Purdue. Dr. Kenney is passionate about mathematics and teaching and finds particular satisfaction when she helps others get past their fear of mathematics and feel successful in their learning.

Contributed Paper Sessions

All rooms are in the Science Center
* denotes graduate student
Unless otherwise denoted, all contributed talks are presented by undergraduate students.

Session: 11:15 a.m. - 12:10 p.m.

Time	11:15 a.m.-11:30 a.m.	11:35 a.m.-11:50 a.m.	11:55 a.m.-12:10 p.m.
Room 107	***On Inverse Semigroups Associated with Markov Subshifts*** Anthony Dickson Youngstown State University	***Quantum Generalized Weyl Algebras*** Phuong Ho Miami University	***Climbing a Mountain using Graph Theory*** Lanny Sparks University of Dayton
Room 108	***Analysis of Weights in Central Difference Formulas*** Preston Boorsma University of Dayton	***Systoles of Hyperbolic Surfaces*** Laurel Heck Oberlin College	***The Brachistochrone Curve*** Payton Reaver University of Dayton
Room 128	***Asymptotic Distribution of the Partition Crank*** Asimina Hamakiotes University of Dayton	***LASSO in Generalized Linear Regression Model*** Khoa Huynh University of Cincinnati	***Neural Networks and the Universal Approximation Theorem*** Dylan Flaute University of Dayton
Room 146	***An Overview of the Connections Between Mathematics and Music*** Christian Hemsath University of Dayton	***Audio Feature Analysis of Popular Songs*** Kylie Timmerman University of Dayton	***Mathemagic and Music*** Raghavendra Bhat Wright State University
Room 150	***Neutral Volterra Difference Equations of Advanced Type*** John Luebking* University of Dayton	***Antimaximum Principle for Periodic Boundary Value Problems*** Dan Neugebauer* University of Dayton	***A Discrete Fractional Order Gradient Descent Law for Function Approximation*** Mohamed Aburakhis* University of Dayton

Session: 3:15 p.m. - 4:10 p.m.

Time	3:15 p.m.-3:30 p.m.	3:35 p.m.-3:50 p.m.	3:55 p.m.- 4:10 p.m.
Room 107	***Derivation of the (Closed-Form) Particular Solution of the Poisson's Equation in 3D Using Oscillatory Radial Basis Function*** Steven Manns Ohio Northern University	***Prime Number Conjectures*** Raghavendar Bhat Wright State University	***Cardinal Numbers & Aleph Null*** Doria Lee Central State University
Room 108	***Lebesgue Integration of Real and Complex Functions*** Preston Boorsma University of Dayton	***The Fourier Series and the Taylor Series*** Elijah Borgman University of Dayton	***Analysis of Taylor Series*** Staci Seitz University of Dayton
Room 146	***Predicting Stock Prices using a Geometric Brownian Motion*** Thomas Clontz University of Dayton	***Optimal Transport in Imaging Science*** Tyler Masthay* University of Texas at Austin	***A Simple Buckling Problem Motivated by the Mechanics of Layered Materials*** Connor Stermer University of Akron
Room 150	***Climbing the Branches of the Graceful Tree Conjecture*** Patrick Cone Indiana University of Pennsylvania	***Automated Conjecture Making: Domination on Planar Graphs*** Jose Garcia Grand Valley State University	***Hamiltonian Cycles in Balanced K-Partite Graphs*** Nicholas Spanier Miami University

Abstracts

11:15 a.m. - 11:30 a.m.

On Inverse Semigroups Associated with Markov Subshifts

Anthony Dickson
Youngstown State University
Room 107

An inverse semigroup is a set with a binary operation satisfying closure and associativity, with each element having a unique inverse - since there is not necessarily an identity element, these inverses are defined differently than those in groups. An inverse hull of a Markov subshift is an inverse semigroup generated by a set of partial bijections. With our research, we found that for an inverse semigroup satisfying certain properties, it is isomorphic to the inverse hull of a Markov subshift.

Analysis of Weights in Central Difference Formulas

Preston Boorsma
University of Dayton
Room 108

Manipulations of Taylor series expansions of increasing numbers of terms yield finite difference approximations of derivatives with increasing rates of convergence. In this talk, we consider central difference approximations of arbitrary order of accuracy. We derive weights of terms in these approximations and explore their limits for increasing orders of accuracy.

Asymptotic Distribution of the Partition Crank

Asimina Hamakiotes
University of Dayton
Room 119

The partition crank is a statistic on partitions introduced by Andrews-Garvan to explain Ramanujan's congruences. In this talk, we prove that the crank is asymptotically equidistributed modulo Q, for any odd whole number Q. To prove this, we obtain effective bounds on the error from Rolon's asymptotic estimate for the crank function. We then use those bounds to prove log-subadditivity of the crank function.

An Overview of the Connections Between Mathematics and Music

Christian Hemsath
University of Dayton
Room 146

I worked with the Berry Summer Thesis Program, sponsored by the Honors Department, during the past summer, performing research into the interconnections between mathematics and music. I worked closely with Dr. Kublik, and gave a fifteen minute presentation at the Berry Summer Thesis Symposium. I will present a brief overview of some of the main connections between mathematics and music, especially with respect to the realms of abstract algebra and group theory.

Neutral Volterra Difference Equations of Advanced Type

John Luebking*
University of Dayton
Room 150

The inversion of a perturbed difference operator may yield the sum of a contraction and a compact operator. In this talk, we consider a neutral difference equation, we add and subtract a linear term and do the proper inversion to get what we call, Neutral Volterra Difference Equations of Advanced Type. Then we use Krasnoselskii fixed point theorem to study existence of solutions."

11:35 a.m. - 11:50 a.m.

Quantum Generalized Weyl Algebras
Phuong Ho
Miami University
Room 107

Generalized Weyl Algebras (GWAs) appear in diverse areas of mathematics including mathematical physics, noncommutative algebra, and representation theory. We study the invariants of quantum GWAs under finite automorphisms. We extend a theorem of Jordan and Wells and apply it to determine the fixed ring of quantum GWAs under diagonal automorphisms. We further study properties of the fixed rings, including global dimension, rigidity, and simplicity.

Systoles of Hyperbolic Surfaces
Laurel Heck
Oberlin College
Room 108

The systole of a hyperbolic surface is the least length of a closed geodesic on the surface. It is an important problem in differential geometry to determine bounds for the systole of a surface in terms of its volume. In this talk we'll give a geometric argument that the systole of a surface is bounded logarithmically in terms of its volume. We'll additionally construct an infinite sequence of hyperbolic surfaces, all of which have the same systole, and whose volumes we can explicitly bound.

LASSO in Generalized Linear Regression Model
Khoa Huynh
University of Cincinnati
Room 119

LASSO, or 'the least absolute shrinkage and selection operator', has been widely used for variable selection in regression models. We are interested in applying LASSO in the framework of the generalized linear regression model, particularly the regression models with binary responses. Link function is an important component in the generalized linear model. Very few researches, if any, are found on how LASSO performs under different link functions. We carried out a simulation study to compare LASSO performance under different link functions as well as how it works when the link function is mis-specified. The link functions we investigated include the commonly used logistic, probit and complementary log-log links. We also compare LASSO with the ridge regression. Our results show that LASSO with the logistic link and probit link perform mostly better than the ridge regression under different link function. The current study helps our future research to build an integrated process of variable selection via LASSO along with a flexible link function.

Audio Feature Analysis of Popular Songs
Kylie Timmerman
University of Dayton
Room 146

This research focuses on analyzing the audio features of the top 100 songs on Spotify in 2017 and 2018. The audio features focused on include tempo, valence, acousticness, speechiness, loudness, energy, and danceability. The research questions look at the common audio features among top ranking songs, the similarities and differences between top ranking songs of 2017 and 2018, the correlation between audio features, the difference in audio features between higher and lower ranked top songs, and the ability to predict one audio feature given other audio features. This research can help to understand why certain songs are streamed the most and could give insight into the upcoming popular trends in music.

11:35 a.m. - 11:50 a.m. (cont'd)

Antimaximum Principle for Periodic Boundary Value Problems

Dan Neugebauer*
University of Dayton

Room 150

We consider the second order boundary value problems

$$x'' + \lambda x = f(t) \tag{1}$$

$$x'' - \lambda x = f(t) \tag{2}$$

$$\text{where} \quad x(0) = x(1), \quad x'(0) = x'(1). \tag{3}$$

It is known that the boundary value problem (2), (3) admits the maximum principle for all $\lambda > 0$. We show that for sufficiently small $\lambda > 0$, the boundary value problem (1), (3) admits the antimaximum principle using in the algebraic tools developed by Meirong Zhang [2010].

11:55 a.m. - 12:10 p.m.

Climbing a Mountain using Graph Theory
Lanny Sparks
University of Dayton
Room 107

Is it possible for two climbers on a mountain range to reach the summit if they are always traveling in the same direction? This question was posed and answered by Alan Tucker in his article titled “The Parallel Climbers Puzzle” and published in Math Horizons. This intriguing problem is the focus of my talk.

The Brachistochrone Curve
Payton Reaver
University of Dayton
Room 108

Elements of Cycloids, Circles and Time.

Neural Networks and the Universal Approximation Theorem
Dylan Flaute
University of Dayton
Room 119

In this talk, we discuss the theoretical justification for a basic class of neural networks. We define neural networks as a specific form of functions with free parameters. We state one form of the Universal Approximation Theorem (UAT) and provide an intuitive explanation for the theorem. Then, we intuitively explain the backpropagation “training” algorithm commonly used for solving for the free parameters in order to approximate functions with neural networks. We present examples to illustrate backpropagation and consider how choices in the design of neural networks affect the applicability of the UAT and the training process. Finally, we discuss how the UAT as presented relates to state-of-the-art machine learning systems.

Mathemagic and Music
Raghavendra Bhat
Wright State University
Room 146

My talk will be a demonstration of mental math of 4-5 digit numbers and a demonstration of correlation of math and music.

A Discrete Fractional Order Gradient Descent Law for Function Approximation
Mohamed Aburakhis*
University of Dayton
Room 150

Discrete fractional calculus (DFC) in the sense of a backward difference is employed to generalize the gradient descent law. A discrete fractional-order gradient descent Law (DFOGDL) is designed based on Caputo fractional difference. The DFOGDL is used to estimate the parameters of an integer order discrete-time system. The stability of estimating structured uncertainties using DFOGDL has been proven. A method to allow the implementation of the DFOGDL in practice will be discussed.

3:15 p.m. - 3:30 p.m.

Derivation of the (Closed-Form) Particular Solution of the Poisson's Equation in 3D Using Oscillatory Radial Basis Function

Steven Manns
Ohio Northern University
Room 107

Partial differential equations (PDEs) are useful for describing a wide variety of natural phenomena, but analytical solutions of these PDEs can often be difficult to obtain. As a result, many numerical approaches have been developed. Some of these numerical approaches are based on the particular solutions. Derivation of these particular solutions are challenging. This work is about how the Laplace operator can be written in a more convenient form when it is applied to radial functions and then use this form to derive the (closed-form) particular solution of the Poisson's equation in 3D with the oscillatory radial basis function in the forcing term.

Lebesgue Integration of Real and Complex Functions

Preston Boorsma
University of Dayton
Room 108

In this presentation, we define the Riemann integral, which is equivalent to the integral defined in most calculus books, and the alternative Lebesgue integral, which is presently the standard integral used in advanced mathematics, each for functions from R to R. We explore examples, advantages, and disadvantages of using each definition. In addition, we develop and state the general definition of the Lebesgue integral and apply it to complex functions.

Predicting Stock Prices using a Geometric Brownian Motion

Thomas Clontz
University of Dayton
Room 146

Geometric Brownian motion (GBM) is a mathematical model that is widely used for modeling stock prices. The process is constructed based on a Brownian motion, which is a collection of random variables with independent and identically distributed normal increments. In this study we have generated paths for a Brownian motion (Wiener process) and a geometric Brownian motion by using Monte-Carlo simulation and MATLAB. The simulated paths can be used to estimate the drift and volatility of a GBM.

Climbing the Branches of the Graceful Tree Conjecture

Patrick Cone
Indiana University of Pennsylvania
Room 150

The Graceful Tree Conjecture is an unsolved problem of graph theory that was first posed by Kotzig, Ringel, and Rosa in 1967 and states that every tree has a graceful labeling. Moreover, a graceful labeling is an assignment of the integers 0 to n to the vertices of the graph so that the edges, when labeled by the absolute value of the difference of the integers placed on the end vertices, are labeled by the integers 1 to n. The results presented showcase the progress we have made using patterns present in the graphs' adjacency matrices. In particular, we focus on the possible labelings of the vertices as they relate to the positions in the associated adjacency matrix. Using these adjacency diagrams, we are able to construct several classes of graceful trees.

3:35 p.m. - 3:50 p.m.

Prime Number Conjectures
Raghavendar Bhat
Wright State University
Room 107

Over the course of time, prime numbers have been the biggest of mysteries in number theory. There have been various claims made and theorems discovered. The goal has always been to find ways to generate primes, understand their randomness and to predict their behavior. Over the course of my teenage, I discovered over 30 conjectures in primes and verified them all up-to billions and trillions. Although, these numbers are tiny in the over all ocean of numbers, I intuitively feel that my conjectures do work for all natural numbers. I wish to share 3-4 of my most complex conjectures at the conference and talk about how, if proven, they can result in a huge progress in modern day number theory.

The Fourier Series and the Taylor Series
Elijah Borgman
University of Dayton
Room 108

Fourier Series are a somewhat intimidating topic because they require the use of complex numbers and Euler's Identity. But if one analyzes the Fourier Series through the lense of calculus, then it reveals its similarities to other series expansions of functions. We will show how the Fourier Series are essentially Taylor series for periodic functions. After defining trigonometric polynomials, we will analyze when a Fourier Series converges, and describe the real valued functions have a convergent Fourier Series. Throughout this discussion we will observe the parallels to the Taylor series. The key theorem described will be Parseval's Theorem on the convergence of a given function's Fourier series. We will also introduce some more advanced topics related to Fourier Analysis that are meant to show applications to other fields. The goal of this exposition will be to try to demystify the Fourier Series for anyone with basic knowledge of trigonometry and series expansions in Calculus.

Optimal Transport in Imaging Science
Tyler Masthay*
University of Texas at Austin
Room 146

Say we own a farm in Cincinnati and two bakeries, one in Cincinnati and one in Dayton. It costs more to move grain to Dayton, but if we send all the grain to Cincinnati, we won't be able to sell all the bread. Optimal transport seeks to answer the question "what is the lowest cost way of transporting the bread?" Applications in imaging science such as biomedical or seismic imaging rely on inferring physical parameters from measurements in order to generate an image. This reduces an optimization problem, which can be formulated with a myriad of metrics. We present recent research into advantages of minimizing the Wasserstein distance, a transport-based metric, in place of the L^2 norm.

Automated Conjecture Making: Domination on Planar Graphs
Jose Garcia
Grand Valley State University
Room 150

A planar graph $G = (V, E)$ is a graph that can be embedded in the plane, i.e. it can be drawn in the plane so that no edges intersect except at the vertices. A subset S of vertices in a graph G is called a dominating set if every vertex $v \in V$ is either an element of S or is adjacent to an element of S. The domination number of a graph G is the smallest cardinality of a dominating set; we denote the domination number as $\gamma(G)$. Automated conjecture making is the process of having a computer generate conjectures. We investigate the domination number of planar graphs with the use of the automated conjecture making.

3:55 p.m. - 4:10 p.m.

Cardinal Numbers & Aleph Null
Doria Lee
Central State University
Room 107

The Cardinal numbers was defined by Cantor in 1874. In this talk we define cardinal numbers and Aleph null.

Analysis of Taylor Series
Staci Seitz
University of Dayton
Room 108

A Taylor Series of $f(x)$ is a power series with coefficients found by evaluating derivatives at a single point. A Taylor Series has an interval of convergence, which varies depending on the original function $f(x)$. On the interval of convergence, the infinite sum of the Taylor Series is exactly equal to the function values. However, there exist functions $f(x)$ that define convergent Taylor Series, but the series converges to a function different than $f(x)$. Pade Approximates are similar to Taylor Polynomials in that they approximate functions, but by utilizing ratios of finite polynomials. In this talk, we compare Taylor Polynomials to Pade Approximates for certain functions and consider the interval of convergence for each approximation, as Pade Approximations of $f(x)$ can converge where the Taylor Series of $f(x)$ does not.

A Simple Buckling Problem Motivated by the Mechanics of Layered Materials
Connor Stermer
University of Akron
Room 146

This research is motivated by an interest in the mechanical response of layered systems to edge loads. We formulate a simple buckling problem for a system consisting of several springs connected to a particle. The springs describe different forces in the system, including a van der Waals force between the particle and nearby walls, and forces from applied edge loads. Our model is derived by writing down the total potential energy for the system. Seeking minima of the total energy leads to a system of algebraic equations that can be solved for equilibrium configurations. Then we vary the different forces acting upon the free particle to determine how the system equilibrates and how many different equilibrium configurations can arise.

Hamiltonian Cycles in Balanced K-Partite Graphs
Nicholas Spanier
Miami University
Room 150

Chen, Faudre, Gould, Jacobson, and Lesniak gave a nearly optimal minimum degree condition which guarantees the existence of a Hamiltonian cycle in a balanced k-partite graph. In many cases however, this degree condition can be slightly improved. We will discuss our recent result which determines the precise minimum degree condition in all cases.

Slate of Schraut Lecturers

- 2000: **Joe Diestel**, Kent State University
  Sums and Series in Vector Spaces
- 2001: **Richard Schoen**, Stanford University
  Geometry in Two and Three Dimensions
- 2002: **Paul Campbell**, Beloit College
  How to Keep Up With Mathematics
- 2003: **Robert Lewand**, Goucher College
  How Not to Get Lost While on a Random Walk
- 2004: **Jane Pendergast**, University of Iowa
  Beyond Reasonable Doubt: The Role of Statistics in Health Research
- 2005: **Patrick Flinn**, National Security Agency
  Gröbner bases: A Natural Extension of Gaussian Reduction and the Euclidean Algorithm
- 2006: **Greg Campbell**, Federal Drug Administration
  The Role of Biostatistics in Medical Devises: Making a Difference in People's Lives Everyday
- 2007: **William Dunham**, Muhlenberg College
  An Euler Trifecta
- 2008: **Robert Bolz**, Lockheed Martin Corporation
  Leadership Founded in Habits of Inquiry and Reflection
- 2009: **Thomas Santner**, The Ohio State University
  These Aren't Your Mothers and Fathers Experiments
- 2010: **Eugene Steuerle**, The Urban Institute
  Every Time I Turn Around There's Dr. Schraut or You Can't Take Mathematics out of a U.D. Mathematics Major

- 2011: **Jeffrey Diller**, University of Notre Dame
  Imaginary Numbers, Unsolvable Equations, and Newton's Method
- 2012: **Lilian Wu**, IBM Technology Strategy and Innovation
  Creating Macroscopes with Technology and Analytics: New Possibilities in Our Lives – The Important Role of Tomorrow's Mathematics Professionals
- 2013: **Thomas Bohman**, Carnegie Mellon University
  Randomness and Pseudorandomness in Combinatorics
- 2014: **Rafe Donahue**, BioMimetic Therapeutics, Inc
  Data Stories and Pictures: Discovering Lessons and Principles for Statistics and Life
- 2015: **Chikako Mese**, Johns Hopkins University
  Riemannian Geometry
- 2016: **David Diller**, CMDbioscience
  A Role for Mathematics in Understanding and Curing Disease?
- *2017:* **Joe Gallian**, University of Minnesota Duluth
  Breaking Driver's License Codes
- *2018:* **Kennon Copeland**, NORC
  Measuring Flu Vaccination Rates
- *2019:* **Tommy Ratliff**, Wheaton College
  So How Do You Detect a Gerrymander?

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