

# Katherine Moore

Seeley Mudd  
Amherst College  
Amherst, MA

kmoore@amherst.edu  
Webpage: [katherinemath.com](http://katherinemath.com)  
[github.com/moorekatherine](https://github.com/moorekatherine)

## EDUCATION

---

- Dartmouth College**, Hanover, NH  
Ph.D. in Mathematics June 2018  
*Patterns in Time Series and Dynamical Systems*  
Advisor: Sergi Elizalde  
A.M. in Mathematics
- Kenyon College**, Gambier, OH  
B.A. in Mathematics (with Highest Honors in Mathematics) May 2012

## ACADEMIC APPOINTMENTS

---

- Amherst College**, Amherst, MA  
Visiting Assistant Professor Fall 2021 - Present
- Wake Forest University**, Winston-Salem, NC  
Teacher-Scholar Postdoctoral Fellow Fall 2018 - Spring 2021

## RESEARCH INTERESTS

---

My work is in discrete applied probability and the mathematical foundations of data science. I am particularly interested in the study and development of methods which can be applied in information-scarce and high dimensional settings. My graduate background is in combinatorics and discrete dynamical systems.

## PUBLICATIONS

---

(\*\* indicates Master's student and \* indicates undergraduate student)

1. Partitioned local depths community analysis of transcriptomic data (M. Khoury\*, K. Berenhaut, K. Moore, A. Harkey, C. Craven\*, E. Allen, D. John, J. Norris, G. Muday), submitted to *PLOS Computational Biology*.
2. A social perspective on perceived distances reveals deep community structure (K. Berenhaut, K. Moore and R. Melvin\*\*), *Proceedings of the National Academy of Sciences*, 11 (4), **2022**.
3. Characterizations and enumerations of patterns of signed shifts (S. Elizalde and K. Moore) *Discrete Applied Mathematics*, (**2019**).
4. Random walk null models for time series data (D. DeFord and K. Moore) *Entropy*, 19 (2017), **615**.
5. Patterns of negative shifts and beta-shifts (S. Elizalde and K. Moore) December 2015. arXiv:[1512.04479](https://arxiv.org/abs/1512.04479).

*Conference Papers:*

1. Hotspot detection in pancreatic neuroendocrine images using local depth (M. Niazi, K. Moore, K. Berenhaut, D. Hartman, L. Pantanowitz, M. Gurcan) *Medical Imaging 2020: Digital Pathology*, (2020).

2. Patterns of signed shifts and negative shifts (K. Archer, S. Elizalde, and K. Moore) *Sem. Lothar. Combin. proc.*, 78B (2017), Article #49. *FPSAC Conference*.

*Software:*

1. pald: Partitioned Local Depth for Community Structure in Data (K. Moore, K. Berenhaut, L. D'Agostino McGowan) **R package available on CRAN**, (2022).
2. Partitioned Local Depth (PaLD) Clustering Analyses in R (L. D'Agostino McGowan, K. Moore, and K. Berenhaut), submitted to *The R Journal*.

*News Articles:*

1. Communities in Data (K. Berenhaut and K. Moore), SIAM News. June 2022.

## AWARDS AND HONORS

---

- MRC: Data Science at the Crossroads of Analysis, Geometry, and Topology 2022  
A week-long collaborative research retreat for early-career researchers funded by the AMS and NSF.
- Project NExT 2019 - 2020  
A teaching-focused professional development program for early-career academics.
- Outstanding Graduate Student Teacher 2017  
Awarded by the Dartmouth Center for Advancement of Learning.
- Dartmouth GAANN Fellowship 2012 - 2013
- Reginald B. Allen Award for Excellence in Mathematics at Kenyon College 2012

## RESEARCH PRESENTATIONS

---

(★ indicates invited talk) Note: Talks April 2020 - 2022 were virtual unless noted otherwise.

- *Cohesion and Communities: Leveraging Human Expertise and Perspective*  
(★) Special Session at JMM: Applied Topology: Theory and Implementation. January 2023
- *Partitioned Local Depths*  
(★) Applied Math and Computation Seminar, UMass Amherst, MA. April 2022  
(★) SIAM Special Session at JMM: Mathematics of Complex Systems. April 2022  
(★) Metron, Inc. December 2021  
Data Science, Statistics and Visualization, SAMSI Conference, NC. July 2020  
Interdisciplinary Applied Math Seminar (Lab of Feng Fu), Dartmouth College, NH. March 2020  
Interdisciplinary Network Science Seminar, Wake Forest University, NC. March 2020
- *Communities in Data* (Department Colloquia)  
(★) Smith College, MA. (in person) October 2021  
(★) Lenoir-Rhyne University, NC. April 2021  
(★) University of Montana, MT. March 2021  
(★) Amherst College, MA. March 2021  
(★) Kenyon College, OH. February 2021  
Wake Forest University, NC. April 2020  
(★) High Point University, NC. October 2019  
Wake Forest University, NC. February 2019  
(★) Davidson College, NC. February 2019
- *A New Perspective on Clustering: Partitioned Local Depth*  
CanaDAM, Canada Mathematical Society. May 2021  
(★) 34th Clemson Mini-Conference on Discrete Math and Algorithms, Clemson, SC. October 2019  
CanaDAM, Vancouver, BC. May 2019
- *Permutation-based Techniques for Estimating Entropy of Time Series*  
Applied and Computational Mathematics Seminar, Dartmouth College, NH. September 2017

- *Permutations in Time Series and Dynamical Systems*
  - (★) AMS Special Session at JMM: Dynamical Algebraic Combinatorics, San Diego, CA. January 2018
  - (★) Combinatorics Seminar, Brandeis University, MA. September 2017
  - (★) New York Combinatorics Seminar, Brooklyn College, NY. September 2017
- *Patterns and Cyclic Permutations in Dynamical Systems*
  - Summer Combo in Vermont, Saint Michael's College, VT. July 2017
  - Permutation Patterns, Reykjavik University, Iceland. June 2017
  - (★) Combinatorics Seminar, Brandeis University, MA. January 2017
- *Patterns Realized by Negative Shifts and Beta-Shifts*
  - Summer Combo in Vermont, Saint Michael's College, VT. July 2016
  - Graduate Student Combinatorics Conference, Clemson University, SC. April 2016
- *Patterns in Chaos* (Department Colloquium)
  - (★) Kenyon College, OH. September 2015

### **POSTERS**

- 19th Annual Graduate Student & Postdoc Research Day, Wake Forest University, NC. March 2019
- Formal Power Series and Algebraic Combinatorics (FPSAC), Queen Mary, London, UK. July 2017
- Discrete Math Days of the Northeast, Dartmouth College, NH. May 2017
- Graduate Poster Session, Dartmouth College, NH. April 2017
- Women's Intellectual Network Research Symposium, Brown, RI. March 2017

## **TEACHING**

---

### **Amherst College**

- Math 272 - Linear Algebra with Applications Fall 2021, Spring 2022, Fall 2022
- Math 220 - Mathematical Reasoning and Proof Spring 2022, Fall 2022
- Math 111i - Calculus 1 (intensive section) Fall 2021

### **Wake Forest University**

- Stats 310/610, Math 357 - Probability Fall 2020, Spring 2021
- Stats 111 - Introduction to Statistics Fall 2020, Spring 2020, Spring 2021
- Math 117 - Discrete Mathematics (introduction to proofs) Fall 2019, Spring 2019
- Math 111 - Calculus with Analytic Geometry Fall 2018
- Math 311 - Introductory Real Analysis Fall 2018

### **Dartmouth College**

- Math 53 - Chaos! Fall 2017
- Math 20 - Probability Summer 2016
- Math 2 - Differential Calculus Winter 2016

### *Teaching Assistant*

- Math 8 - Integral Calculus Fall 2013, Winter 2015
- Math 12 - Honors Multivariable Calculus for First Years Fall 2012

### **OTHER TEACHING ACTIVITIES**

- Project NExT** (Fellow) 2019 - 2020
- Peer Learning Workshop on Online Learning** (Statistics, Wake Forest) 2020
- "Small Teaching Online" Group** (Center for the Advancement of Teaching at Wake Forest) 2020
- Dartmouth Mathematics Teaching Seminar** 2015
  - An intensive 120-contact hour course including discussion, implementation and supervision.
- Dartmouth Center for the Advancement of Learning** 2015 - 2017
  - Frequent workshop participant (e.g., *Improv for Researchers Series*).

## SUPERVISED RESEARCH PROJECTS

---

### Supported Undergraduate Research Student (URECA Fellowship)

Kevin Woytowich

Summers 2019, 2020

*Price Differences in Revisiting Non-Revisiting Random Walks*

### Master's Students Committee Member

Orlando Ferrer

2018 - 2020

*Price Dynamic Random Walks on General Graphs*

Yichen Han

2018 - 2020

*Degree-wise Effects and the Friendship Paradox Under Configuration Models*

## COMMUNITY

---

### Dartmouth Center for the Advancement of Learning

2015 - 2017

Led sessions for graduate teaching assistants on diversity and inclusivity in the classroom.

### AWM Mentor Program at Wake Forest (Mentor)

2019 - 2021

### Sonia Kovalevesky Day

2012 - 2018

Organized the annual math day in May 2016, designed and led sessions throughout.

### Exploring Mathematics at Dartmouth

2015

Collaboratively developed two week-long workshops for high school students.

## SERVICE

---

Graduate Admissions Committee (Mathematics and Statistics, Wake Forest)

2019 - 2020

Curriculum Committee Member (Mathematics, Wake Forest)

2018 - 2019

Advisory Board Member (Dartmouth Center for the Advancement of Learning)

2017 - 2018