

# Corrine Yap

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## Research Interests

My research interests lie broadly in discrete mathematics, and more specifically in extremal and probabilistic combinatorics, and intersections of combinatorics and statistical physics.

## Education

**PhD in Mathematics | Expected May 2023 | Rutgers University, New Brunswick, NJ**

- Advisor: Bhargav Narayanan

**Bachelor of Arts | May 2016 | Sarah Lawrence College, Bronxville, NY**

- Concentrations in Mathematics and Theater
- Attended Budapest Semesters in Mathematics and Moscow Art Theatre School for one semester each.

## Papers

- [8] **Reconstructing Random Pictures**, with B. Narayanan. *In preparation (12+ pages)*.
- [7] **Trees Maximizing the Number of Almost-Perfect Matchings**, with S. Cambie, B. McCoy, G. Sharma, and S. Wagner. *Submitted*. [[arXiv](#)]
- [6] **New Stepping-Up Constructions for Multicoloured Hypergraphs**, with Q. Dubroff, A. Girão, and E. Hurley. *Submitted*. [[arXiv](#)]
- [5] **Algorithms for the Ferromagnetic Potts Model on Expanders**, with C. Carlson, E. Davies, N. Fraiman, A. Kolla, and A. Potukuchi. *63rd Annual IEEE Symposium on Foundations of Computer Science (FOCS 2022)*. [[arXiv](#)]
- [4] **Simplicial Homeomorphs and Trace-Bounded Hypergraphs**, with J. Long and B. Narayanan. *Discrete Analysis*, 2022:6. [[doi](#)], [[arXiv](#)]
- [3] **Properties for the Fréchet Mean in Billera-Holmes-Vogtmann Treespace**, with M. Anaya, O. Anipchenko-Ulaj, A. Ashfaq, J. Chiu, M. Kaiser, M. S. Ohsawa, M. Owen, E. Pavlechko, K. St. John, S. Suleria, K. Thompson. *Advances in Applied Mathematics*, 120, 2020. [[doi](#)]
- [2] **Unipancyclic Matroids**, with W. Agnew-Svoboda, A. Huszar, E. McNicholas, J. Schreiner-McGraw, and C. Starr. *Discrete Mathematics*, 342(8):2254–2269, 2019. [[doi](#)]
- [1] **On Determining if Tree-Based Networks Contain Fixed Trees**, with M. Anaya, O. Anipchenko-Ulaj, A. Ashfaq, J. Chiu, M. Kaiser, M. S. Ohsawa, M. Owen, E. Pavlechko, K. St. John, S. Suleria, and K. Thompson. *Bulletin of Mathematical Biology*, 78(5):961–969, 2016. [[doi](#)], [[arXiv](#)]

## Awards & Fellowships

- University & Louis Bevier Dissertation Completion Fellowship, Rutgers University (2022–23)  
*awarded annually to 16 Rutgers PhD students across all disciplines*
- Association for Women in Mathematics Student Chapter Award for Fundraising & Sustainability (2021)  
*awarded to chapter while president, for “success in increasing membership and diversity of events”*
- AMS Rutgers Student Chapter Prize for Leadership (2018, 2021)  
*for “leadership and service to the department and to other mathematical communities, institutions, and initiatives [that is] exemplary and outstanding in its scope, efficacy, and impact.”*
- Janice Pattwell Annual Mathematics Fellowship Award, Rutgers University (2020)
- TA Teaching Excellence Award, Rutgers Mathematics Department (Spring 2020, Fall 2020)
- NASA New Jersey Space Grant Consortium Scholarship, Rutgers University (2016–17)

- GAANN Fellowship, Rutgers University (2016–17)
- Edward Cogan Prize for Mathematics and Sciences, Sarah Lawrence College (2016)  
*“to recognize a graduating senior exhibiting excellence in mathematics and science”*

## Teaching Experience

### Rutgers University | Instructor of Record | 2020–2021

- 123: Preparation for Calculus Fall 2021 (hybrid),  
Spring 2021 (online)  
*Half-semester precalculus course, flipped course format using adaptive homework system Knewton Alta*
- 454: Combinatorial Theory Summer 2020 (online)  
*Wrote and incorporated 26 inquiry-based worksheets on the course material.*

### Rutgers University | Teaching Assistant | 2018–2020

- Head TA Summer 2020  
*Observed other graduate student instructors and gave pedagogical feedback.*
- 351: Introduction to Abstract Algebra Fall 2020 (online)
- 250: Linear Algebra Spring, Fall 2019
- 152: Calculus II for Mathematics and Physical Sciences Fall 2019, Spring 2018
- 151: Calculus I for Mathematics and Physical Sciences Fall 2018, 2019

### MathILy and MathILy-Er | Apprentice Instructor | Summers 2015–present

MathILy, or "serious Mathematics Infused with Levity," is a five-week intensive summer math program for high school students to learn undergraduate-to-graduate level mathematics via inquiry-based instruction. MathILy-Er, or "MathILy Earlier," is a similar program for students with less mathematical preparation.

- Co-taught classes with PhD instructors on the following topics: discrete math, linear algebra, computational geometry, topological graph theory, persistent homology, mathematics of politics, and non-Euclidean geometry.
- Developed and taught week-long minicourses on the following topics: the probabilistic method, linear algebraic methods in combinatorics, Ramsey theory, random walks, surreal numbers, generating functions, and voting methods.

### Directed Reading Program Mentor | Rutgers University | 2018

- Mentored an undergraduate student in a semester-long project on Markov chains

## Presentations

### Research

\* denotes invited talk

#### *Almost-Perfect Matchings in Trees*

- Joint Math Meetings: AMS Special Session on Trees in Many Contexts\* Jan. 2023

#### *Algorithms for the Potts Model*

- Joint Math Meetings: AWM Poster Presentation Jan. 2023
- Georgia Tech Combinatorics Seminar\* Oct. 2022
- AMS Western Sectional: Special Session on Graphs, Hypergraphs, and Set Systems\* Oct. 2022
- BIRS Workshop: Cross-Community Collaborations in Combinatorics May 2022

#### *Intersections of Statistical Mechanics and Combinatorics*

- Student Symposium in Combinatorics: Plenary Talk\* May 2022

#### *Multicolored Hypergraph Ramsey Theory*

- Iowa State University: Discrete Mathematics Seminar\* Apr. 2022
- New York Combinatorics Seminar\* Apr. 2022
- Rutgers Discrete Mathematics Seminar Feb. 2022

### *A Topological Turán Problem*

- Rutgers Discrete Mathematics Seminar Oct. 2021
- AWM We Speak Series: Lightning Talks Sept. 2021
- University of Illinois Chicago: Combinatorics and Probability Seminar\* Mar. 2021
- Webinar in Additive Combinatorics Mar. 2021
- Oxford Discrete Math and Probability Seminar Mar. 2021
- Webinar in Extremal and Probabilistic Combinatorics Jan. 2021

### *Reconstructing Random Pictures*

- University of Illinois Chicago: Combinatorics and Probability Seminar\* Sept. 2021

### **Non-Research**

#### *Inquiry-Based Learning in the College Classroom*

- Association of Mathematics Teachers of New Jersey (AMTNJ), Teaching Matters Conference Oct. 2022

#### *Defining Your Mathematical Identity*

- OURFA<sup>2M</sup> “Our Stories” Talk\* Dec. 2021

#### *A Tour of Methods in Combinatorics*

- Yale Undergraduate Mathematics Seminar\* Apr. 2021
- Willamette Undergraduate Colloquium\* Apr. 2021

#### *Crossing Disciplines: Probabilistic Combinatorics and Mathematical Theater*

- STEM Enrichment Youth: STEM World Virtual Conference\* Aug. 2021

#### *The Mathematics of Origami: Flat-Foldability*

- Dickinson College: Undergraduate Math/CS Colloquium\* Apr. 2019
- Rutgers Graduate Pizza Seminar: Open House for Prospective Students Mar. 2019

### **Service & Leadership**

- Graduate Student Liaison Committee 2018–present  
*As chair: plans and facilitates meetings with graduate director and department chair; assigns tasks to other committee members and oversees event-planning, in addition to member tasks. As member: communicates student concerns to department; organizes Open House for graduate students and various mentoring and social events.* (Chair 2020–present)
- Co-Organizer, Math Teaching Seminar 2019–present
- Fellow, Rutgers Academy for the Scholarship of Teaching and Learning (RASTL) 2019–present  
*Selective group of graduate students and faculty across departments that meets once a month to discuss pedagogy.*
- Organizer, Combinatorics Reading Seminar 2020–present
- Co-Organizer, Rutgers Discrete Math Seminar 2021–present
- Founder and President, Association for Women in Mathematics Student Chapter at Rutgers University 2018–2022  
*Organized professional development workshops and panels, and community-building events such as weekly lunches and book clubs.*
- Fellow, Rutgers PreDoctoral Leadership Development Academy 2021–22  
*Selective program of 25 graduate students across departments that met weekly to learn about and discuss leadership in higher education*
- TA Orientation Leader, Rutgers School of Graduate Studies Orientation 2019–20
- Organizer, Graduate Combinatorics Seminar 2018–20
- Organizer, Graduate Pizza Seminar 2017–18

## Mathematical Performance & Outreach

I wrote a one-woman play called *Uniform Convergence* and have performed it off-Broadway (2017), at MAA MathFest (2018), and at 15 different academic institutions since 2017. A performance will take place at the 2023 Joint Math Meetings in Boston. More information is on my website.

## Conferences & Research Workshops

- Cornell Probability Summer School (TA) July–Aug. 2022  
*Led supplementary problem sessions on Phase Transitions and Counting*
- AMS Math Research Community June 2022  
*Trees in Many Contexts*
- Banff International Research Station Workshop June 2022  
*Cross-Community Collaborations in Combinatorics*
- 7<sup>th</sup> Lake Michigan Workshop on Combinatorics and Graph Theory May 2022
- Frontiers of Statistical Mechanics and Theoretical Computer Science, University of Illinois Chicago Dec. 2021
- SAMSI Program on Combinatorial Probability (online) Spring 2021  
*Research Working Group on Phase Transitions and Algorithms*
- Woman and Mathematics, Institute for Advanced Study May 2017  
*Geometry and Randomness in Group Theory*