

# Corrine Yap

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Georgia Institute of Technology | cyap35@gatech.edu | [www.corrineyap.com](http://www.corrineyap.com)

## 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.

## Employment

**Georgia Institute of Technology | Aug. 2023—present**

Visiting Assistant Professor, School of Mathematics

Postdoctoral Fellow, Algorithms and Randomness Center (ARC)

## Education

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

- Advisor: Bhargav Narayanan
- Dissertation: Several Problems in Extremal and Probabilistic Combinatorics

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

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

## Papers

[9] **Bounding Mean Orders of Sub- $k$ -Trees of  $k$ -Trees**, with S. Cambie, B. McCoy, and S. Wagner. *Submitted*. [\[arXiv\]](#)

[8] **Reconstructing Random Pictures**, with B. Narayanan. *Submitted*. [\[arXiv\]](#)

[7] **Trees Maximizing the Number of Almost-Perfect Matchings**, with S. Cambie, B. McCoy, G. Sharma, and S. Wagner. *Submitted*. [\[arXiv\]](#)

[6] **Tower Gaps in Multicolour Ramsey Numbers**, with Q. Dubroff, A. Girão, and E. Hurley. *Forum of Mathematics: Sigma*, 11 (2023): E84. [\[doi\]](#) [\[arXiv\]](#)

[5] **Algorithms for the Ferromagnetic Potts Model on Expanders**, with C. Carlson, E. Davies, N. Fraiman, A. Kolla, and A. Potukuchi. *Proceedings of 63rd Annual IEEE Symposium on Foundations of Computer Science (FOCS 2022)*, 344-355. [\[doi\]](#) [\[arXiv\]](#)

[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, provides full funding for final year*
- 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)  
*provided full funding and stipend for bridge-to-PhD studies*
- 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”*

## Presentations

### Invited Lecture Series

- ISM Summer School on Random Trees, Graphs, and Maps May 2023  
*Three lectures on the intersections of statistical physics and combinatorics*

### Invited Conference and Workshop Talks

- Joint Math Meetings: AMS Special Session on Thresholds in Random Structures Jan. 2024
- AMS Southeastern Sectional: Special Session on Extremal & Probabilistic Combinatorics Oct. 2023
- AMS Central Sectional: Special Session on Advances in Graph Theory & Combinatorics Oct. 2023
- 8<sup>th</sup> Lake Michigan Workshop in Combinatorics and Graph Theory May 2023
- AMS Central Sectional: Special Session on Extremal Graph Theory Apr. 2023
- AMS Western Sectional: Special Session on Graphs, Hypergraphs, and Set Systems Oct. 2022
- Student Symposium in Combinatorics: Plenary Talk (virtual) May 2022
- OURFA<sup>2M</sup> “Our Stories” Talk (virtual, non-research) Dec. 2021
- STEM Enrichment Youth: STEM World Virtual Conference (non-research) Aug. 2021

### Invited Seminar Talks

- Lehigh-Minnesota Joint Probability Seminar (virtual) Dec. 2023
- Duke Joint Combinatorics and Probability Seminar Oct. 2023
- Emory Discrete Math Seminar Aug. 2023
- University of Delaware Discrete Math Seminar May 2023
- CRM-ISM Montreal Probability Seminar Feb. 2023
- Carnegie Mellon ACO Seminar Dec. 2022
- Georgia Tech Combinatorics Seminar Oct. 2022
- Iowa State University Discrete Mathematics Seminar Apr. 2022
- New York Combinatorics Seminar (virtual) Apr. 2022
- University of Illinois Chicago Combinatorics and Probability Seminar Sept. 2021
- Yale Undergraduate Mathematics Seminar (virtual) Apr. 2021
- Willamette Undergraduate Colloquium (virtual) Apr. 2021
- University of Illinois Chicago Combinatorics and Probability Seminar (virtual) Mar. 2021
- Dickinson College Undergraduate Math/CS Colloquium Apr. 2019
- Rutgers Graduate Pizza Seminar: Open House for Prospective Students Mar. 2019

### Contributed Talks

- Joint Math Meetings: AMS Special Session on Trees in Many Contexts Jan. 2023
- Joint Math Meetings: AWM Poster Presentation Jan. 2023

- BIRS Workshop: Cross-Community Collaborations in Combinatorics May 2022
- Rutgers Discrete Mathematics Seminar Feb. 2022, Oct. 2021
- AWM We Speak Series: Lightning Talks (virtual) Sept. 2021
- Webinar in Additive Combinatorics (virtual) Mar. 2021
- Oxford Discrete Math and Probability Seminar (virtual) Mar. 2021
- Webinar in Extremal and Probabilistic Combinatorics (virtual) Jan. 2021

## Research Workshop Participation

- Banff International Research Station Workshop Aug. 2024  
*Topic: Frontiers of Statistical Mechanics and Theoretical Computer Science*
- Oberwolfach Workshop Jan. 2024  
*Topic: Discrete Geometry*
- Cornell Probability Summer School (TA) July–Aug. 2022  
*Led supplementary problem sessions on Phase Transitions and Counting*
- AMS Math Research Community June 2022  
*Topic: Trees in Many Contexts*
- Banff International Research Station Workshop June 2022  
*Topic: Cross-Community Collaborations in Combinatorics*
- SAMSI Program on Combinatorial Probability (virtual) Spring 2021  
*Research Working Group on Phase Transitions and Algorithms*
- Woman and Mathematics, Institute for Advanced Study May 2017  
*Topic: Geometry and Randomness in Group Theory*

## Teaching Experience

### MathILy and MathILy-Er

| **MathILy-Er Director** | Sept. 2023–present

| **MathILy-Er Lead Instructor** | Summers 2023–present

| **{MathILy, MathILy-Er} Apprentice Instructor** | Summers 2015–22

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.

- As Lead Instructor, developed a two-week IBL course on discrete probability, which includes an introduction to probability, probabilistic methods of proof, thresholds in random graphs, Polya's theorems for random walks, Markov chains, lattice percolation, and simulations of the Ising and hardcore models.
- As Apprentice Instructor, co-taught classes with Lead 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, extremal combinatorics, Ramsey theory, random walks, surreal numbers, generating functions, and voting methods.

### Georgia Tech | Instructor of Record | 2023–present

- 1711: Finite Mathematics Fall 2023

## 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

## Service & Leadership

### Conference Session Organization

- JMM AMS Special Session on Extremal & Probabilistic Combinatorics Jan. 2024
- AWM Research Symposium: Special Session on Extremal & Probabilistic Combinatorics Oct. 2023

### Referee

SODA (ACM-SIAM Symposium on Discrete Algorithms), Proceedings of the American Mathematical Society, European Journal of Mathematics

### Graduate School Activities

- Graduate Student Liaison Committee 2018–23  
*As chair: facilitated meetings with graduate director and department chair; assigned tasks to other committee members and oversaw event-planning, in addition to member tasks.*  
*As member: communicated student concerns to department; organized Open House for graduate students and various mentoring and social events.* (Chair 2020–23)
- Fellow, Rutgers Academy for the Scholarship of Teaching and Learning (RASTL) 2019–23  
*Selective group of graduate students and faculty across departments that met once a month to discuss pedagogy.*
- Founder and President, Association for Women in Mathematics Student Chapter at Rutgers University 2018–22  
*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*
- Seminar Organizer  
*Discrete Math Seminar (co-organizer, 2021-23), Combinatorics Reading Seminar (2020-23), Math Teaching Seminar (co-organizer, 2019-23), Graduate Combinatorics Seminar (2018-20), Graduate Pizza Seminar (co-organizer, 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), at the Joint Math Meetings (2023), and by invitation at 20 different academic institutions since 2017. More information is on my website.