Corrine Yap

Georgia Institute of Technology | math@corrineyap.com | www.corrineyap.com

Research Interests

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

Positions

Georgia Institute of Technology | Aug. 2023–present

> Visiting Assistant Professor, School of Mathematics

> Postdoctoral Fellow, Algorithms and Randomness Center (ARC)

Simons Laufer Mathematical Sciences Institute | Jan.–May 2025

> Stephen della Pietra Postdoctoral Fellow (joint with two programs, *Probability and Statistics of Discrete Structures* and *Extremal Combinatorics*)

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

[10] **Trees Maximizing the Number of Almost-Perfect Matchings**, with S. Cambie, B. McCoy, G. Sharma, and S. Wagner. To appear in *Applicable Analysis and Discrete Mathematics.* [arXiv]

[9] **Reconstructing Random Pictures**, with B. Narayanan. *Random Structures & Algorithms* 66.1 (2025): e21282. [doi] [arXiv]

[8] **Fast and Slow Mixing of the Kawasaki Dynamics on Bounded-Degree Graphs**, with A. Kuchukova, M. Pappik, and W. Perkins. Extended abstract in *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (APPROX/RANDOM 2024)*, Volume 317, pp. 56:1-56:24. [doi] [arXiv]

[7] **Algorithms for the Ferromagnetic Potts Model on Expanders,** with C. Carlson, E. Davies, N. Fraiman, A. Kolla, and A. Potukuchi. *Combinatorics, Probability and Computing.* 2024;33(4):487–517. Extended abstract in *Proceedings of 63rd Annual IEEE Symposium on Foundations of Computer Science (FOCS 2022),* 344-355. [doi] [arXiv]

[6] **Bounding Mean Orders of Sub-k-Trees of k-Trees**, with S. Cambie, B. McCoy, and S. Wagner. *The Electronic Journal of Combinatorics,* 31(1): P1.62 (2024). [doi] [arXiv]

[5] **Tower Gaps in Multicolour Ramsey Numbers**, with Q. Dubroff, A. Girão, and E. Hurley. *Forum of Mathematics: Sigma,* 11: E84 (2023).
Extended abstract in *Proceedings of European Conference on Combinatorics, Graph Theory, and Applications (EUROCOMB '23).* [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

· AWM Travel Grant (2024)

· [CIOS Honor Roll](#), Georgia Tech (Fall 2024, Spring 2024)
  top 25% of instructors, based on student responses to part of the Course/Instructor Opinion Survey

· University & Louis Bevier Dissertation Completion Fellowship, Rutgers University (2022–23)
  awarded annually to 16 Rutgers PhD students from across all disciplines, provides stipend for final year

· AMS Graduate Student Travel Grant (2022)

· 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."

· 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"

· 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 funding and stipend for bridge-to-PhD studies

· GAANN Fellowship, Rutgers University (2016–17)
  provided funding and stipend for bridge-to-PhD studies

· Edward Cogan Prize for Mathematics and Sciences, Sarah Lawrence College (2016)
  "to recognize a graduating senior exhibiting excellence in mathematics and science"

Invited Talks

Invited Lectures and Plenary Talks   ** denotes virtual talk*

· 2nd Brazilian School of Combinatorics at IMPA, Rio de Janeiro (upcoming)	Mar. 2025
· 25th Triangle Lectures in Combinatorics at UNC Wilmington (plenary)	Sept. 2024
· ISM Summer School on Random Trees, Graphs, and Maps in Montreal	May 2023
Three lectures on the intersections of statistical physics and combinatorics	
· Student Symposium in Combinatorics (plenary)*	May 2022

Invited Conference and Workshop Talks

· SLMath Introductory Workshop: Probability & Statistics of Discrete Structures	Jan. 2025
· Joint Math Meetings: AMS Special Session on Coloring Problems in Combinatorics	Jan. 2025
· Atlanta Lecture Series XXIX in Combinatorics and Graph Theory	Nov. 2024
· AMS Western Sectional: Extremal Combinatorics & Connections	May 2024
· Joint Math Meetings: AMS Special Session on Thresholds in Random Structures	Jan. 2024
· AMS Southeastern Sectional: Extremal & Probabilistic Combinatorics	Oct. 2023
· AMS Central Sectional: Advances in Graph Theory & Combinatorics	Oct. 2023

- 8th Lake Michigan Workshop in Combinatorics and Graph Theory .... May 2023
- AMS Central Sectional: Extremal Graph Theory .... Apr. 2023
- AMS Western Sectional: Graphs, Hypergraphs, and Set Systems .... Oct. 2022
- OURFA^2M^2 "Our Stories" Talk (non-research)* .... Dec. 2021
- STEM Enrichment Youth: STEM World Virtual Conference* .... Aug. 2021

Invited Seminar Talks
- University of Illinois Chicago Combinatorics and Probability Seminar .... Oct. 2024
- MIT Combinatorics Seminar .... Oct. 2024
- Carleton College Undergraduate Math/Stats Colloquium .... Sept. 2024
- Auburn University Discrete Math Seminar .... Feb. 2024
- Lehigh-Minnesota Joint Probability Seminar* .... 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* .... Apr. 2022
- University of Illinois Chicago Combinatorics and Probability Seminar .... Sept. 2021
- Yale Undergraduate Mathematics Seminar* .... Apr. 2021
- Willamette Undergraduate Colloquium* .... Apr. 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
- Dickinson College Undergraduate Math/CS Colloquium .... Apr. 2019
- Rutgers Graduate Pizza Seminar: Open House for Prospective Students .... Mar. 2019

Contributed Talks
- BIRS Workshop: Frontiers (lightning talk) .... Aug. 2024
- Oberwolfach Workshop: Discrete Geometry .... Jan. 2024
- 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* .... Sept. 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

Georgia Tech | Instructor of Record | 2023–present
- 4221: Stochastic Processes I   Fall 2024
  *A second course in probability for math and CS majors. Topics include random
  walks, Markov chains, branching processes, convergence, and martingales. 40-
  student course run in an inquiry-based format.*

- 4032: Combinatorial Analysis   Spring 2024
  *A second course in combinatorics for math and CS majors. Topics included
  enumeration, extremal and probabilistic combinatorics, and linear algebraic
  methods. 40-student course run in an inquiry-based format; assessments
  consisted of writing projects, problem sets, and a presentation.*

- 1711: Finite Mathematics   Fall 2023
  *90-student lecture course for business, policy, and language students. Topics
  included basic counting, probability, statistics, linear algebra, and applications.*

Rutgers University | Instructor of Record | 2020–2021
- 123: Preparation for Calculus   Fall 2021 (hybrid),
  Half-semester precalculus course, flipped course format using adaptive   Spring 2021 (online)
  homework system Knewton Alta

- 454: Combinatorial Theory   Summer 2020 (online)
  *A first proof-based course in combinatorics. 28-student course run in an
  inquiry-based format over Zoom. Wrote and incorporated 21 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
| 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.

Service & Leadership

Conference Session Organization

· JMM AMS Special Session on Extremal Combinatorics & Random Discrete Structures	Jan. 2025
· 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 Combinatorics, STOC (ACM Symposium on the Theory of Computation), Journal of Graph Theory, SIAM Journal on Discrete Mathematics

Graduate School Activities

· Graduate Student Liaison Committee *Planned and facilitated meetings with graduate director and department chair; assigned tasks to other committee members and oversaw event-planning; communicated student concerns to department; organized Open House for graduate students and mentoring and social events.*	2018–23 (Chair 2020–23)
· Fellow, Rutgers Academy for the Scholarship of Teaching and Learning (RASTL) *Selective group of graduate students and faculty across departments that met once a month to discuss pedagogy.*	2019–23
· Founder and President, Association for Women in Mathematics Student Chapter at Rutgers University *Organized professional development workshops and panels, and community-building events such as weekly lunches and book clubs.*	2018–22
· Fellow, Rutgers PreDoctoral Leadership Development Academy *Selective program of 25 graduate students across departments that met weekly to learn about and discuss leadership in higher education*	2021–22
· TA Orientation Leader, Rutgers School of Graduate Studies Orientation	2019–20

· 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 at 27 different academic institutions since 2017. More information is on my website.