Corrine Yap

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Research Interests

My research interests lie broadly in the intersections of combinatorics, probability, and statistical physics, which includes problems about Markov chains, approximate sampling algorithms, extremal combinatorics, and random graphs.

Positions

Mount Holyoke College | July 2026–present

Assistant Professor of Mathematics, Department of Mathematics and Statistics

Georgia Institute of Technology | Aug. 2023–July 2026

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

[14] **Local Large Deviations for Triangles in Sparse Random Graphs**, with J. Lintott and W. Perkins. Submitted. [arXiv]

[13] **Diameters and Mixing Times for Giant Components of Random Graphs with Given Degrees**, with L. Addario-Berry and B. Reed. Submitted. [arXiv]

[12] **Fixed-Magnetization Ising on Random Graphs Up to Reconstruction**, with R. Gheissari and W. Perkins. Submitted. [arXiv]

[11] **On Random Locally Flat-Foldable Origami**, with T. Hull and M. Michelen. Submitted. [arXiv]

[10] **Fast and Slow Mixing of the Kawasaki Dynamics on Bounded-Degree Graphs**, with A. Kuchukova, M. Pappik, and W. Perkins. *Random Structures & Algorithms*. 67 (2025), no.4, e70038. [doi] [arXiv]
Extended abstract in *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (APPROX/RANDOM 2024)*. 317 (2024), pp. 56:1-56:24. [doi]

[9] **Trees Maximizing the Number of Almost-Perfect Matchings**, with S. Cambie, B. McCoy, G. Sharma, and S. Wagner. *Applicable Analysis and Discrete Mathematics.* 19 (2025), no. 1, pp. 104-129. [doi] [arXiv]

[8] **Reconstructing Random Pictures**, with B. Narayanan. *Random Structures & Algorithms.* 66 (2025), no.1, e21282. [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.* 33 (2024), no. 4, pp. 487–517. [doi] [arXiv]
Extended abstract in *Proceedings of 63rd Annual IEEE Symposium on Foundations of Computer Science (FOCS 2022),* 344-355. [doi]

[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 (2024), no.1, P1.62. [doi] [arXiv]

[5] **Tower Gaps in Multicolour Ramsey Numbers**, with Q. Dubroff, A. Girão, and E. Hurley. *Forum of Mathematics: Sigma.* 11 (2023), E84. [doi] [arXiv]
Extended abstract in *Proceedings of European Conference on Combinatorics, Graph Theory, and Applications (EUROCOMB '23)*. P380-385. [doi]

[4] **Simplicial Homeomorphs and Trace-Bounded Hypergraphs**, with J. Long and B. Narayanan. *Discrete Analysis.* 2022:6, 12pp. [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 (2019), no. 8, pp 2254–2269. [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 (2016), no. 5, pp 961–969. [doi] [arXiv]

Awards & Fellowships

- AMS-Simons Travel Grant (2025-27)
- "Thank-a-Teacher" Certificate, Center for Teaching and Learning at Georgia Tech (2025, 2026)
- AWM Travel Grant (2024)
- US Junior Oberwolfach Fellow (2024)
  travel support to attend a week-long workshop at MFO
- CIOS Honor Roll, Georgia Tech (Spring 2026, 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

Invited Talks

Invited Lectures, Plenary Talks, and Colloquia ** denotes virtual talk*

- Amherst College Math Colloquium — Oct. 2026
- Cornell Oliver Club (colloquium) — Sept. 2025
- 2nd Brazilian School of Combinatorics at IMPA, Rio de Janeiro (plenary) — Mar. 2025
- 25th Triangle Lectures in Combinatorics at UNC Wilmington (plenary) — Sept. 2024
- Carleton College Math/Stats Colloquium — 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
- Willamette College Colloquium* — Apr. 2021
- Dickinson College Math/CS Colloquium — Apr. 2019

Invited Conference and Workshop Talks

- SIAM Discrete Mathematics, Minisymposium: Extremal & Probabilistic Combinatorics — June 2026
- JMM AMS Special Session: Nonconventional Methods in Combinatorics — Jan. 2026
- AMS Southeastern Sectional, Special Session: Recent Advances in Graph Theory — Oct. 2025
- SLMath Introductory Workshop: Probability & Statistics of Discrete Structures — Jan. 2025
- JMM AMS Special Session: Coloring Problems in Combinatorics — Jan. 2025
- Atlanta Lecture Series XXIX in Combinatorics and Graph Theory — Nov. 2024
- AMS Western Sectional, Special Session: Extremal Combinatorics & Connections — May 2024
- JMM AMS Special Session: Thresholds in Random Structures — Jan. 2024
- AMS Southeastern Sectional, Special Session: Extremal & Probabilistic Combinatorics — Oct. 2023
- AMS Central Sectional, Special Session: Advances in Graph Theory & Combinatorics — Oct. 2023
- 8th Lake Michigan Workshop in Combinatorics and Graph Theory — May 2023
- AMS Central Sectional, Special Session: Extremal Graph Theory — Apr. 2023
- AMS Western Sectional, Special Session: 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

- Smith College Math Lunch Seminar — Oct. 2026
- CUNY Probability Seminar — Mar. 2026
- UMass Amherst Discrete Math Seminar — Nov. 2025
- Georgia Tech Combinatorics Seminar — Oct. 2025
- Georgia State University Combinatorics Seminar — Oct. 2025
- Stanford Probability Seminar — May 2025
- University of Washington Combinatorics Seminar — Apr. 2025
- UC Davis Probability Seminar — Feb. 2025
- University of Illinois Chicago Combinatorics and Probability Seminar — Oct. 2024
- MIT Combinatorics Seminar — Oct. 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
- 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
- Rutgers Graduate Pizza Seminar: Open House for Prospective Students — Mar. 2019

Contributed Talks

- JMM AMS Special Session on Trees in Many Contexts — Jan. 2023
- JMM AWM Poster Presentation — Jan. 2023
- Rutgers Discrete Mathematics Seminar — Feb. 2022, Oct. 2021
- AWM We Speak Series: Lightning Talks* — Sept. 2021

Research Workshop Participation

** gave a contributed or invited talk*

- PhaseCAP Workshop at CWI Amsterdam — May 2026
  Topic: Phase Transitions in Algorithms
- 20th Probability and Combinatorics Workshop at Bellairs Institute, Barbados* — March 2026
- Rocky Mountain Summer Workshop in Algorithms, Probability, & Combinatorics* — June 2025
- 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 | 2023–2026

- 4032: Combinatorial Analysis — Spring 2026, 2024
  A second course in combinatorics for math and CS majors. Topics included enumeration, extremal and probabilistic combinatorics, and linear algebraic methods. 40-50-student course run in an inquiry-based format.
- 1553 Linear Algebra — Fall 2025
  120-student core introductory lecture course, highly coordinated and required for several STEM majors.

- 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.
- 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), Spring 2021 (online)
  Half-semester precalculus course, flipped course format using adaptive 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 inquiry-based course on discrete probability, which includes an introduction to probability, probabilistic methods of proof, thresholds in random graphs, Pólya'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 Computing), Journal of Graph Theory, SIAM Journal on Discrete Mathematics

Graduate School Activities

- Graduate Student Liaison Committee 2018–23
  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. (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
- 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 32 different academic institutions since 2017. More information is on my website.