Kunal Chawla

Curriculum Vitae

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Education

2022 –	**M.Sc., Mathematics**, *University of Toronto*.
2019 – 2022	**B.Sc., Mathematics**, *University of Toronto*, *GPA – 3.99*.

Notable Courses: Probability I and II (Graduate, A+), Real Analysis I and II (Graduate, A+), Ergodic Theory (Graduate, A+), The Discrete Mathematics Toolkit (Graduate, A+), Random Matrix Theory (A+), Enriched Data Structures and Algorithms (A+)

Papers and Preprints

2022   **The Poisson Boundary of Hyperbolic Groups without Moment Conditions**, *with Behrang Forghani, Joshua Frisch, and Giulio Tiozzo*, Preprint.

2022   **Effective Drift Estimates For Random Walks on Graph Products**, Submitted.

Experience

2022   **Research Intern**, University of Toronto.
Worked with Professors Kasra Rafi amd Giulio Tiozzo to study geometry and dynamics of hyperbolic groups acting on their boundaries. Learned about symbolic codings, entropy, and topological dynamics. Funded by a UTEA award and resulted in a preprint.

2021   **Research Intern**, University of Toronto.
Worked with Professor Giulio Tiozzo to study random walks on groups with hyperbolic properties. Used techniques from information theory, probability, combinatorics, and geometry to study asymptotic properties of Markov Processes. Funded by an NSERC USRA and resulted in a short preprint.

2020   **Summer Intern**, Department of Defense, Ottawa.
Engineered large datasets in order to test state-of-the-art time series anomaly detection methods using machine learning toolkits. Worked in a month-long workshop on embedding words and graph data, where I implemented novel algorithms for creating embeddings.

Teaching and Community Work

2020-2022   **UofT Math Student Union**.
Organized workshops on writing, graduate applications, and a weekly undergraduate seminar. I also started a first-year peer mentorship program in the math department, which has run for two years with $\sim$ 50 participants.

2021-2022   **First-Year Learning Community Mentor**.
Organized bi-weekly sessions to help a group of $\sim$30 first-year mathematics students adjust to university.

2022   **Teaching Assistant**.
Hired to TA advanced undergraduate courses in graph theory, probability, and combinatorics.

Awards

2022	NSERC Canada Graduate Scholarship – Master's
2022	Margaret Isobel Elliott Graduate Scholarship
2022	University College Award for Best Degree
2022	University of Toronto Excellence Award
2022	Harold Willett Stewart Memorial Scholarship
2022	Samuel Beatty In-Course Scholarship
2021	NSERC Undergraduate Summer Research Award
2020	Galois Scholarship
2020	Lynd Ferguson Memorial Scholarship
2019	George Roderick Fraser Scholarship
2019	President's Scholar of Excellence

Talks Given

2022 **A Dynamical Characterization of Hyperbolic Groups**.
Hyperbolic Lunch Seminar

2022 **Large Deviations for Random Walks on Hyperbolic Groups**.
UofT Dynamics Seminar

2021 **How to Count with Entropy**.
UofT Undergraduate Seminar

2021 **Farey Fractions and Hyperbolic Geometry**.
Canadian Undergraduate Math Conference

2020 **An Introduction to Geometric Group Theory**.
Canadian Undergraduate Math Conference

Conferences, Workshops, and Summer Schools

2022 **AIM Workshop "Random Walks Beyond Hyperbolic Groups"**.

2021 **Geometric Group Theory without Boundaries II**.

2021 **UNCG Summer School: Applications of Expander Graphs to Number Theory and Computer Science**.