

Ali Karim Lalani

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EDUCATION

University of Toronto

Toronto, Canada

Honours B.Sc., Mathematics Major and Computer Science Major

Sep. 2023 – Expected Jun. 2027

- **Cumulative GPA:** 3.98/4.00
- **Graduate coursework:** Online Algorithms, Algebraic Complexity Theory, Boolean Function Analysis, Quantum Information, Quantum Algorithms and Complexity, Algebraic Topology, Algebraic Methods in Theoretical Computer Science, Discrepancy Theory.
- **Selected undergraduate coursework:** Probability and Statistics I, Algorithm Design and Analysis, Real Analysis, Partial Differential Equations, Algebra I–II, Groups, Rings and Fields, Complex Analysis, Computability and Complexity, Software Tools and Systems Programming, Computer Organization, Software Design.

RESEARCH EXPERIENCE

Undergraduate Researcher

2026 – Present

Prof. Allan Borodin, University of Toronto

Toronto, Canada

- Working on problems in online algorithms and competitive analysis.
- A manuscript arising from this work is in preparation.

Undergraduate Researcher

Summer 2026

Prof. Shubhangi Saraf, University of Toronto

Toronto, Canada

- Studied tensor rank and related questions for algebraically defined tensors in algebraic complexity theory.
- This work led to the preprint listed below.

Undergraduate Research Assistant

May 2025 – Sep. 2025

Prof. Dror Bar-Natan, University of Toronto

Toronto, Canada

- Studied computational data for the Θ invariant of knots and used it to identify patterns and formulate conjectures.
- Wrote Mathematica code to generate, process, and analyze data associated with the invariant.

PREPRINTS AND RESEARCH REPORTS

Ali Karim Lalani. *A Note on the Tensor Rank of Algebraically-Defined Tensors.* [\[PDF\]](#)

2026

Ali Karim Lalani. *A Computational Survey of the Theta Invariant.* [\[PDF\]](#)

2025

- An associated [Wolfram Community article](#) was selected as a Staff Pick.

TEACHING EXPERIENCE

Teaching Assistant, PHL245 — Modern Symbolic Logic

Sep. 2024 – Dec. 2024

University of Toronto

Toronto, Canada

- Led weekly Logic Lab sessions and office hours covering propositional logic, formal reasoning, and related course material.
- Provided individual problem-solving support and feedback to undergraduate students.
- Invigilated the final examination.

ADDITIONAL ACADEMIC EXPERIENCE

Canadian Open Mathematics Competition Grader

Oct. 2025

Canadian Mathematical Society

Remote

- Graded over 400 solutions to proof-based problems in combinatorics and elementary number theory.

AWARDS AND HONOURS

University of Toronto Excellence Award	2026
– C\$7,500 undergraduate research award.	
Dr. Sergiy and Tetyana Kryvoruchko Undergraduate Award	2026
– Awarded to two outstanding undergraduate students in the Department of Mathematics.	
Drew Thompson Scholarship	2025
– In-course scholarship awarded on the basis of academic achievement.	
University of Toronto Excellence Award	2025
– C\$7,500 undergraduate research award supporting research with Prof. Dror Bar-Natan.	
University of Toronto International Scholar Award	2023 – Present
– Merit-based entrance scholarship with a total value of C\$100,000.	

TECHNICAL SKILLS

Programming: Python, C, Java, MATLAB, Wolfram Language

Libraries and Tools: NumPy, pandas, Matplotlib, Mathematica, gem5, Git, L^AT_EX