

Adrian She

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Education

University of Toronto

PhD in Mathematics

Toronto, ON

September 2020 - June 2024

University of Toronto

Master of Science in Computer Science
Specialized in Theoretical Computer Science

Toronto, ON

September 2018 - August 2020

University of British Columbia (UBC)

Bachelor of Science

Vancouver, BC

September 2013 - April 2018

Combined Honours in Mathematics and Computer Science, Minor in Physics

Academic Awards

- National Sciences and Engineering Council of Canada: NSERC Canada Graduate Scholarship - Doctoral (2020-2023)
- University of Toronto Faculty of Arts and Science Masters' Recruitment Award (2019)
- UBC Computer Science Outstanding Undergraduate Teaching Assistant Award (2018)
- Stanley M. Grant Scholarship for Mathematics Students (2016, 2017)
- Reginald Palliser-Wilson Scholarship for Mathematics Students (2015)
- TREK Excellence Scholarship for Academic Achievement (2014, 2015)

Teaching Experience

Humber College

Part-Time Professor

Toronto, ON

September 2024 - December 2024

- Gave course lectures for 2 sections of RAPP 5004: Quantitative Research Methods and Analysis I (approx. 30 students per section), an introduction to statistics course for Humber post-graduate programs.

University of Toronto

Sessional Instructor

Toronto, ON

January 2020 - December 2024

- Incorporated active-learning activities to students during lectures for both small courses (approx. 30 students) and large courses (approx. 100 students).
- Effectively administered the course by preparing lectures, course assessments, responding to student inquiries, and training TAs.

Recent courses include:

- MAT 186: Calculus I (Fall 2024)
- CSC 265: Enriched Data Structures and Analysis (Fall 2024)
- CSC 463: Computability and Complexity Theory (Winter 2020)

University of Toronto Mathematics Department

Lead Teaching Assistant

Toronto, ON

January 2021 - December 2024

- Supervised and trained about 20 new TAs, particularly in marking and facilitating groupwork.
- Designed course assignments and tutorials for calculus and linear algebra courses that were used by hundreds of students.
- Performed statistical analysis and wrote an internal report about student learning outcomes in linear algebra.

University of Toronto Mathematics Department

Toronto, ON

Teaching Assistant

January 2019 - December 2024

Responsible for leading student tutorials, holding office hours, and marking assignments in courses:

- MAT 294: Calculus and Differential Equations (Fall 2021, Fall 2024)
- MAT 237: Multivariable Calculus (Summer 2021, Summer 2024)
- MAT 187: Calculus II for Engineering (Winter 2020, Winter 2021, Winter 2024)
- MAT 185: Linear Algebra for Engineering Science (Winter 2024)
- MAT 336: Introduction to Analysis (Winter 2024)
- MAT 301: Groups and Symmetries (Summer 2021, Fall 2021, Winter 2022, Fall 2023)
- MAT 136: Calculus II (Fall 2023)
- MAT 224: Linear Algebra II (Winter 2021)
- MAT 186: Calculus I for Engineering (Fall 2020)
- MAT 188: Linear Algebra for Engineering (Fall 2020)
- MAT 344: Introduction to Combinatorics (Winter 2019)

University of Toronto Computer Science Department

Toronto, ON

Teaching Assistant

September 2018 - August 2020

Responsible for creating online materials for:

- CSC 373: Algorithm Design, Analysis, and Complexity (Summer 2020)

Responsible for leading student tutorials and marking assignments in courses:

- CSC 236: Introduction to Theoretical Computer Science (Fall 2018, Fall 2019)
- CSC 463: Computability and Complexity Theory (Winter 2019)

UBC Computer Science Department

Vancouver, BC

Teaching Assistant

May 2014 - April 2018

Responsible for leading student tutorials and marking assignments in courses:

- CPSC 320: Intermediate Algorithm Design and Analysis (Fall 2016, Winter 2017, Fall 2017, Winter 2018)
- CPSC 121: Models of Computation (Fall 2015, Winter 2016)
- CPSC 110: Computation, Programs, and Programming (Summer 2014, Fall 2014)

Research Interests and Expertise

- Quantum algorithms and complexity theory
- Algebraic complexity theory
- Proof complexity
- Discrete mathematics

Research Experience

University of Toronto

Toronto, ON

Graduate Research Student

September 2018 - June 2024

- Developed a new approach to analyze quantum query algorithms, which was presented at conferences and seminars to communicate the results to the broader scientific community.
- Investigated problems in quantum algorithms and complexity theory with collaborators, leading to the publication of 5 papers in journals and conference proceedings.

UBC Math Department

Vancouver, BC

Undergraduate Research Student

May 2016 - August 2018

- Developed novel conjectures in combinatorics and graph theory during Undergraduate Summer Research Assistant (USRA) program, leading to the publication of 2 papers in journals.
- Used software packages in MATLAB and Python to formulate and verify candidate conjectures.

Publications

arXiv publications available at https://arxiv.org/a/she_a_2.html.

1. K. Marwaha, **A. She**, J. Sud, 2024. Performance of Variational Algorithms for Local Hamiltonian Problems on Random Regular Graphs.
arXiv preprint 2412.15147
2. N. Galesi, J. Grochow, T. Pitassi, and **A. She**, 2023. On the algebraic proof complexity of Tensor Isomorphism.
arXiv preprint 2305.19320.
In Proceedings of Computational Complexity Conference (CCC) 2023.
3. **A. She**, and H. Yuen, 2023. Unitary Property Testing Lower Bounds by Polynomials.
arXiv preprint 2210.05885.
In Proceedings of Innovations in Theoretical Computer Science (ITCS) 2023.
Presented at Quantum Information Processing (QIP) 2023.
4. P. Chaugule, M. Kumar, N. Limaye, C.. M. Mohapatra, **A. She**, S. Srinivasan, 2023. Schur polynomials do not have small formulas if the determinant does not.
arXiv preprint 1911.12520
In Proceedings of Computational Complexity Conference (CCC) 2020.
Published in *computational complexity, Volume 32*
5. P. Chatterjee, M. Kumar, **A. She**, B. L. Volk, 2022. A quadratic lower bound for algebraic branching programs.
arXiv preprint 1911.11793.
In Proceedings of Computational Complexity Conference (CCC) 2020.
Published in *computational complexity, Volume 31*.
6. S. Dahlberg, **A. She**, and S. van Willigenburg, 2021. Chromatic Posets.
arXiv preprint 1909.12394
Published in *Journal of Combinatorial Theory, Series A, Volume 184*
7. S. Dahlberg, **A. She**, and S. van Willigenburg, 2019. Schur and e -positivity of trees and cut vertices.
arXiv preprint 1901.02468
Published in *Electronic Journal of Combinatorics, Volume 27, Issue 1*.

Presentations

- “On the algebraic proof complexity of Tensor Isomorphism”:
- Computational Complexity Conference (CCC 2023), July 2023.
- “Unitary Property Testing Lower Bounds by Polynomials”:

- Innovations in Theoretical Computer Science (ITCS 2023), January 2023.
 - University of Victoria Theory Seminar, March 2023.
 - University of Texas Austin Quantum Seminar, April 2023.
 - Quantum BC Research Day, April 2023 (Poster Presentation).
 - Joint Centre for Quantum Information and Computer Science (QuiCS) Seminar, May 2023.
 - SIAM Conference on Applied Algebraic Geometry, "Algebraic and Geometric Structures in Quantum Information" Mini-Symposium, July 2023.
 - UBC Theoretical Computer Science Seminar, October 2023.
 - University of Waterloo IQC CS/Math Seminar, November 2023.
 - University of Toronto Theory Seminar, May 2024.
- **"Schur polynomials do not have small formulas if the determinant does not"**
 - Computational Complexity Conference 2020, July 2020.
 - ToniCS Conference, Simons Institute, University of California Berkeley, March 2023.

Service

- Subreviewer for papers submitted to QIP 2020, CCC 2021, ITCS 2023, ICALP 2023, ITCS 2024, QIP 2024, STOC 2024, TQC 2024, CCC 2024, FOCS 2024 conferences.
- Mentored undergraduate research project through UBC Quantum Computing Club, Summer 2023.
- Organizer and webmaster for Theory Student Seminar during Winter 2022.
- Mathematics Mentor (Winter 2020, 2021, 2022): Volunteered time to mentor and teach talented high school students interested in pursuing post-secondary education or a career related to mathematics.