

## Education

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University of Toronto • Master of Engineering, Mechanical Engineering	09/24 - Present
University of Toronto • Honours Bachelor of Science, Mathematics with High Distinction; 3.85 final 2-year GPA	09/19 - 06/24

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## Research

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Research Student • University of Toronto Department of Civil Engineering; Dr. Hamed Ibrahim - <i>Master's project in ocean-atmosphere dynamics</i>	06/24 - Present
Research Student • University of Toronto Department of Physics; Dr. Morgan O'Neill - <i>Project 1: Modelling of Polar Vortex Crystals on Jupiter</i> ; translated original model to Python; programmed netCDF output into the model; parallelized code and ran on the Niagara supercomputer for greater efficiency; improved model includes cumulus drag, a new storm forcing function, ; compiled Jupiter-like parameters from the literature and ran months-long simulations to study Jupiter-like polar vortex dynamics. - <i>Project 2: Deep Learning for Simulation of Giant Planet Polar Vortices</i> ; original project proposal. Constructed and trained new neural networks to predict polar vortex dynamics of Saturn; I was the first person in the lab to introduce machine learning methods. - Studied and incorporated numerical simulation, geophysical fluid dynamics, planetary and atmospheric science, and machine learning. Tools included Python, MATLAB, Fortran, Machine Learning, parallel programming, high performance computing. - Funded by the University of Toronto Department of Physics Summer Research Award (\$9,500).	05/24 - Present
Jackman Research Scholar • Institute for the Study of University Pedagogy; Dr. Margaret Karrass - <i>Project: Developing an Evidence-Based Support Program for First-Year Math Students and Their TAs</i> ; investigated how TAs identify and remediate knowledge gaps that impede first-year math students' academic success, as part of a greater project aimed at developing a new support program for students in first-year math courses. - Conducted literature review on psychological process and object conception in mathematics; developed and administered an evidence-based interview protocol to math TAs; analyzed collected data using qualitative research techniques; presented final research poster at the Jackman Research Colloquium. - Funded by the Jackman Scholarship (\$1000 and on-campus residence and food accommodations).	05/24 - 06/24
Research Student • University of Toronto Department of Mathematics; Dr. Emmy Murphy - <i>Project: Study of Exotic Seven-Dimensional Spheres</i> ; manifolds that are homeomorphic to but not diffeomorphic to the standard seven-dimensional Euclidean sphere. - This project compiled and introduced all the tools needed to understand exotic spheres. I also included a new and different technique from Milnor's original work to prove the homeomorphism, by directly computing the homology of the exotic sphere, as well as a brief overview of current work. - Topics include differential topology, cohomology and homology theory, characteristic classes, and Morse theory. - Resulted in my senior thesis project: <i>On Exotic Spheres</i> (10,000+ words; awarded 100%).	01/24 - 04/24
Research Assistant • University of Toronto Dept. of Math. and Comp. Sciences; Dr. Margaret Karrass - Project 1: Study on the effectiveness of articulation for non-mathematics students learning mathematics. - Project 2: Development of course materials for a new university course on numeracy. - Project 3: Research into mathematics history and culture and related pedagogical techniques. - Project 4: Compiled an environmental scan report on interdisciplinary studies programs in North American universities by request of the ISUP Director.	12/22 - 04/24
Research Trainee • University of Toronto Department of Biomedical Engineering; Dr. Milad Lankarany - <i>Project: Characterize Parameters of Synaptic Plasticity from Neural Recordings in Patients with Parkinson's Disease.</i> - Assisted with code review and translation (MATLAB, Python). - Study and incorporate a variety of techniques in computational neuroscience and statistics including generalized linear models and LIF neuron models.	05/22 - 08/22

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## Teaching

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### University of Toronto TA Teaching Excellence Award Finalist

04/23

- The only undergraduate finalist in award history.
- 14 finalists were selected from 324 faculty-sponsored and student-nominated Teaching Assistants across all campuses.

### Assistant Coordinator • University of Toronto Dept. of Mathematical and Computational Sciences

09/22 - Present

- Managed team of 7-8 Teaching Assistants, assigned grading schemes, handled regrade requests and student concerns, contributed to test and exam development.
- MAT102 Intro. to Mathematical Proofs (1 semester)
- MAT132 Differential Calculus for Life Science (2)
- MAT134 Integral Calculus for Life Science (2)

### Teaching Assistant • University of Toronto Dept. of Mathematical and Computational Sciences

01/22 - Present

- 1700+ total contracted hours and 250+ tutorial sessions.
- Hosted multiple weekly office hours and tutorials, assisted instructor during active learning lectures, prepared class material, graded assessments, invigilated tests and exams, assisted in curriculum development.
- MAT102 Intro. to Mathematical Proofs (3 semesters)
- MAT132 Differential Calculus for Life Science (2)
- MAT133 Calculus & Linear Algebra for Commerce (1)
- MAT134 Integral Calculus for Life Science (4)
- MAT135 Differential Calculus (1)
- MAT236 Vector Calculus (2)
- ISP130 Numeracy for University and Beyond (1)
- Writing Development Initiative (1)

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## Relevant Skills & Courses

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**Skills:** Python, MATLAB, LaTeX, High Performance Computing (Niagara cluster, shell scripting, parallel programming), netCDF, HTML, Machine Learning (PyTorch, TensorFlow, Keras, Scikit-learn, pandas)

**Undergraduate Courses:** Hamiltonian Mechanics, Computability Theory, Probability, Differential Geometry, PDEs

**Graduate Courses:** General Relativity, Fluid Mechanics, Turbulent Flows, Atmospheric Physics, Advanced Atmospheric Dynamics, Advanced Dynamics, Deep Learning, Computational Methods for Partial Differential Equations

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## Honours

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| - <b>University of Toronto Dept. of Physics Summer Research Award</b> (Value: \$9,500)   | - <b>University of Ottawa Graduate Admissions Scholarship</b> (Value: \$28,000)                              |
| - <b>Jackman Scholar Award</b> (Value: \$1,000 + on-campus accommodations)               | - <b>University of Ottawa Graduate Special Merit Scholarship</b> (Value: \$7,500)                            |
| - <b>Top Undergraduate Thesis</b> Highest grade in department (100%)                     | - <b>Qualified for (Discontinued) Mathematical and Computational Sciences Honour Roll x2</b> 22/23 and 23/24 |
| - <b>Queen's University Mathematics Summer School</b> Selected to attend the annual QMSS | - <b>2023 University of Toronto TA Teaching Excellence Award Finalist</b>                                    |
| - <b>Queen's University Graduate Admissions Scholarship</b> (Value: \$50,000)            | - <b>University of Toronto National Biology Scholar</b>  |
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## Involvement & Other Employment

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**Jackman Scholar Research Colloquium** (Poster Presentation) 05/24

**2024 Canadian Undergraduate Mathematics Conference** (Attendee) 07/24

**Exotic Spheres: a high-level introduction • University of Toronto Mississauga Math Club** (Talk) 10/23

**Introduction to Field Extensions • University of Toronto Mississauga Math Club** (Talk) 10/22

**Math & Science Tutor and Summer Research Project Contributor • Paper** 11/21 - 03/23

- K-12 math & science tutor for a service freely provided to students through their school board; contributed to development and implementation of new tutor performance evaluation framework.

**Assembly Line Worker • Fiat Chrysler Automobiles** 06/20 - 05/21

- Full-time assembly line worker; assembled vehicles and vehicle parts; trained for and operated heavy machinery and industrial chemicals; trained new staff in various assembly line roles.

**Newspaper Carrier • Metroland Media** 01/20 - 03/20

**Assembly Line Worker • Wonderland Food & Emporium** 07/19 - 08/19

- Mass-produced confectionaries for wholesale; inventory control; operated heavy machinery; order fulfillment

**Crew Member and Maintenance Worker • McDonald's** 11/17 - 07/19

- Prepare food; inventory control; 1 of only 3 maintenance workers; maintained heavy equipment; trained new staff
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