

TOWA SHIXUN HUANG

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Education

University of Toronto St. George

Bachelor of Science in Mathematics and Computer Science

Toronto, Ontario

Sep. 2022 – Jun. 2026

- Major in **Mathematics** and **Computer Science**, minor in **Statistics**
- **CGPA: 3.89/4.00** | University of Toronto Excellence Award (\$8,000), Dean's List Scholar (3 years)
- Relevant coursework: *Real Analysis, Linear Algebra, Probability and Statistics, Numerical Methods, Computational Finance, Machine Learning, Computational Differential Equations, Deep Learning*

Experience

Dynamic Graphics Project Lab

Apr 2025 – Present

UTEA Undergraduate Student Researcher, Supervisor: Eitan Grinspun

Toronto, ON

- Developed input-convex model reduction for full-space simulations with large deformations and collisions
- Implemented stable Newton-based solvers for nonlinear material and contact energies
- Learned reduced subspaces via PCA, Autoencoders, and ICNNs for efficient deformation reconstruction
- Benchmarked models on accuracy, stability, and generalization to unseen motions

Dalla Lana School of Public Health

June 2024 – Present

Undergraduate Student Researcher, Supervisor: Jude Dzevela Kong

Toronto, ON

- Developed advanced SEIRS models using differential equations, integrating Fourier series for seasonal dynamics and Bayesian inference (**MCMC**, **rstan**) for precise parameter estimation, calibrated on Canadian influenza data
- Applied numerical methods and nonlinear optimization techniques to refine model calibration and validation
- Conducting a systematic review of 120 studies on mathematical and machine learning approaches in epidemiology, synthesizing key methodologies, emerging trends, and best practices

Undergraduate Calculus Teaching Assistant

Sept 2025 – Present

Department of Mathematics, University of Toronto

Toronto, ON

- Assisted in teaching undergraduate calculus, reinforcing key concepts in limits, derivatives, and integrals
- Led two weekly tutorials emphasizing analytical reasoning and problem-solving
- Prepared detailed solution sets and contributed to grading to ensure consistency and rigor

Publications

Huang, S., Bragazzi, N. L., *et al.*, & Kong, J. D. (2025). *A systematic review of mathematical and machine learning models of Avian Influenza*. One Health, 21, 101203. <https://doi.org/10.1016/j.onehlt.2025.101203>

Projects

Superconductor Transition Temperature Prediction | PyTorch, Transformer

Nov 2024 – Dec 2024

- Curated dataset with Material Project API, including crystal data, atomic positions, and transition temperatures
- Developed a sentence-structured input, encoding crystal data into 25D vectors via Gaussian-mapped atomic positions
- Integrated Transformer-based model for superior crystal input representation, leveraging the complex CIF structure
- Achieved preliminary MAEs of 0.85 and 0.99 for two models through extensive pre-training

Numerical Methods for Option Pricing | Matlab, Iterative Method, Finite Difference

Mar 2025 – Apr 2025

- Implemented and analysed finite difference methods for computational finance
- Applied these methods to the **Black-Scholes Equation** for European put options and studied the convergence
- tackled the American put options by implementing constrained matrix optimization using projected SOR
- Visualized solution surfaces and convergence trends in detailed plots for technical reporting and presentation purposes

Technical Skills

Programming Languages: Python, Java, C, C++, MATLAB, R, SQL

Developer Tools: VS Code, Git, Linux Shell, PyCharm, IntelliJ, L^AT_EX

Frameworks and Libraries: pandas, NumPy, SciPy, PyTorch, pymatgen, scikit-learn, PyMC