

BORIS LI

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Education

University of British Columbia, Vancouver, BC
BSc Combined Honours Physics & Mathematics

Sep 2020 – Apr 2024

- Honours thesis (supervised by Prof. Ian Frigaard): [Stability of Two-fluid Concentration Gradients](#)
- 2-time Dean's Scholar (90% or better average)
- 2-time Dean's List (80% or better average)
- Science One, class of 2021

Notable advanced undergraduate (400-level) or graduate (500-level) classes taken:

- MATH 422/501 Fields & Galois Theory: Field extensions, the Galois correspondence, finite fields, insolvability in radicals, ruler and compass constructions.
- MATH 423/502 Commutative Algebra: Commutative rings and modules, fractions, primary decompositions, Noetherian rings, homological algebra.
- MATH 532 Algebraic Geometry I: Affine & projective varieties, sheaves of regular functions, morphisms between varieties.
- MATH 412 Advanced Linear Algebra: Direct sum and direct product, spaces of homomorphisms and duality, quotient vector spaces, multilinear algebra & tensor products; structure theory for linear maps, minimal polynomial & Jordan canonical form; analysis with vectors and matrices.
- MATH 425/525 Introduction to Modern Differential Geometry: Manifolds, vector bundles, tensors, integration on manifolds.
- MATH 426 Introduction to Topology: Point-set topology, covering spaces, fundamental groups.
- MATH 437/537 Elementary Number Theory: Divisibility, congruences, Diophantine equations, arithmetic functions, quadratic reciprocity.
- MATH 440/508 Complex Analysis: Residue theorem, the argument principle, conformal mapping, the maximum modulus principle, harmonic functions, representation of functions by integrals, series, and products.
- MATH 420/507 Real Analysis I: σ -algebras, Lebesgue & Borel measures, measurable functions, integration, convergence theorems, L^p spaces, Hölder & Minkowski inequalities, Lebesgue and/or Radon-Nikodym differentiation.

Publications

A. Abghari et al. "Reassessment of the dipole in the distribution of quasars on the sky". Preprint, (2024) arXiv: [2405.09762](#).

- Contribution: Initial data analysis

Research

University of British Columbia, Vancouver, BC
Departments of Mathematics and Mechanical Engineering
Undergraduate Research Assistant

May – Aug 2023

- Supervised by Prof. Ian Frigaard
- Studied the fluid mechanics behind flow between a heavier Herschel-Bulkley fluid on top of a lighter Newtonian fluid in a vertical pipe
- Utilized both experimental techniques, and simulations through ParaFOAM

University of British Columbia, Vancouver, BC
Department of Physics and Astronomy
Undergraduate Research Assistant

May – Aug 2022

- Supervised by Prof. Douglas Scott
- Studied the dipole anisotropy of quasar distributions from WISE data
- Utilized astronomy-related Python packages, such as Astropy, Healpy, and PolSpice

Teaching

University of British Columbia, Vancouver, BC
Science One Program
Undergraduate Teaching Assistant

Sep 2021 – Apr 2024

- 3 years for the Physics and Mathematics portions of SCIE 001
- Led tutorials, held office hours independently, and marked exams

University of British Columbia, Vancouver, BC
Department of Computer Science
Undergraduate Teaching Assistant

Sep 2021 – Apr 2024

- 6 terms for CPSC 110: Computation, Programs, and Programming
- Led labs alongside other TAs, held office hours independently, marked exams, and helped train new TAs

University of British Columbia, Vancouver, BC
Department of Mathematics
Undergraduate Academic Assistant

May – Aug 2021

- Wrote and designed questions for PrairieLearn, an online homework and testing platform, based on the CLP textbooks¹
- Developed a system for units-aware problems in PrairieLearn, which has now been merged into the main repository²³

¹<https://personal.math.ubc.ca/~CLP/>

²<https://github.com/PrairieLearn/PrairieLearn/pull/4801>

³<https://github.com/PrairieLearn/PrairieLearn/pull/6790>

Projects

Cube Project: A Robotic Rubik's Cube Solver

Apr 2023

affiliated with PHYS 319: Electronics Laboratory

- Constructed hardware and software behind a mechanical Rubik's Cube solver using a MSP430 micro-controller and six NEMA 17 stepper motors
- Wrote software in C and Python to facilitate communication between the solving algorithm and the robotic solver

Minimalist Cube Timer

Dec 2021

affiliated with CPSC 210: Software Construction

- Wrote a small timer for Rubik's Cube solving in Java

The Efficiency of the Rubik's Cube: A Numerical Analysis of Rubik's Cube Speed-Solving Methods, with a Focus on CFOP & Roux

Apr 2021

affiliated with SCIE 001: Science One

- Self-guided research project analyzing the speeds of different Rubik's Cube solving methods, utilizing a computer simulation⁴

The Century-Old Problem: A Brief Overview of the Poincaré Conjecture and Perelman's Solution

Dec 2020

affiliated with SCIE 001: Science One

- Expository prose dedicated to covering the Poincaré Conjecture and solution, with the intended audience being first-year undergraduate students

Awards

Undergraduate Student Research Award (CAD\$12000 over 2 awards)

2022 – 2023

National Sciences and Engineering Research Council of Canada

Stanley M Grant Scholarship in Mathematics (CAD\$4350 over 2 awards)

2022 – 2023

UBC Department of Mathematics

Charles and Jane Banks Scholarship (CAD\$490 over 2 awards)

2021 – 2022

UBC Faculty of Science

Trek Excellence Scholarship (CAD\$1500)

2022

University of British Columbia

⁴<https://github.com/Cadenze/t2-cube>