

Jiahao(Justin) Li

Curriculum Vitae

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EDUCATION

University of British Columbia, Okanagan Campus

2023–Present

B.Sc. in Mathematics, Concentration in Pure Mathematics
Department of Mathematics, Physics and Statistics

GRE Mathematics Subject Test: 900/990, 91st percentile

RESEARCH INTERESTS

My research interests are primarily in homotopy theory, particularly manifold and functor calculus, simplicial homotopy theory, ∞ -category theory, homotopical algebraic geometry, and chromatic homotopy theory. I also have interests in mathematical physics, mathematical biology, and stochastic processes.

RESEARCH EXPERIENCE

Mathematical Biology Research Group, UBC Okanagan

Research with Dr. Eric Foxall

May 2026–Present

Collaborative research on stochastic age-structured population models, with a manuscript in preparation.

- Developed stochastic-process methods for analyzing reproductive value in age-structured branching models.
- Studied different notions of reproductive value and their sensitivity to perturbations in age-dependent birth and mortality rates.
- Developed and verified rigorous arguments concerning the probabilistic behavior of the model.

Research-Focused Directed Study, UBC Okanagan

Supervisor: Dr. Paul Tsopméné

January 2026–May 2026

Research on manifold calculus of functors, focusing on the classification of homogeneous functors.

- Proved a conjectured weak homotopy equivalence between a Kan complex constructed by Tsopméné and Stanley and the classifying space of a simplicial monoid.
- Developed an alternative approach by replacing the simplicial structure with its underlying semisimplicial structure, and established the technical results required for the proof.
- Studied the relationship between manifold calculus, simplicial homotopy theory, and classifying spaces.
- Authored the resulting research manuscript, “On the Classifying Space of Homogeneous Functors.”

PUBLICATIONS AND MANUSCRIPTS

1. **Li, J.** (2026). “On the Classifying Space of Homogeneous Functors.” *arXiv:2606.25142*. “”
2. Foxall, E., **Li, J.**, Okamura, M., and Stark, B. “Probabilistic Approach to the Sensitivity of Reproductive Value for Age-Structured Models.” Manuscript in preparation. ““

PRESENTATIONS

CMPS Undergraduate Research Conference, UBC Okanagan

2026 Manifold Calculus of Functors and Classification of Homogeneous Functors

Mathematical Biology Research Group, UBC Okanagan

2026 Geometric Quantization in Mathematical Quantum Physics

ADVANCED MATHEMATICAL TRAINING

Summer School on Homotopy Colimits, University of Regina

June 2026

Funded advanced training in homotopy theory, including model categories, homotopy colimits, simplicial methods, ∞ -categories, equivariant homotopy theory, cubical functor calculus, and classifying spaces.

Directed Study in Mathematical Quantum Physics, UBC

Supervisor: Dr. Eric Fozall

May–August 2026

Independent study based primarily on the graduate text, B. Hall's *Quantum Theory for Mathematicians*, covering spectral theory of unbounded self-adjoint operators, Lie groups and Lie algebras, representation theory, Hamiltonian mechanics, and geometric quantization.

Independent Study

Selected texts:

- Riehl, E., *Categorical Homotopy Theory*.
- Rotman, J., *An Introduction to Homological Algebra*.
- Rudyak, Y., *On Thom Spectra, Orientability, and Cobordism*.
- Félix, Y., Halperin, S., and Thomas, J., *Rational Homotopy Theory*.
- Switzer, R., *Algebraic Topology—Homology and Homotopy*.
- Arkowitz, M., *Introduction to Homotopy Theory*.
- Mac Lane, S., *Categories for the Working Mathematician*.

AWARDS

Student Union Blue and Gold Scholarship

2026 Awarded to undergraduate students in even years

Deputy Vice-Chancellor Scholarship for Continuing Students, UBC Okanagan

2024, 2025, 2026 Awarded to students demonstrating outstanding academic achievement.

Governor General's Academic Medal

2023 Awarded to the highest-achieving graduating student at the recipient's Canadian secondary school.

BC Achievement Scholarship

2023 Awarded to the top 8000 highschool graduate student in British Columbia

Vernon School District 22 Okanagan Award

2023 Awarded to the highschool student with the highest grade in Precalculus 12.

SKILLS

Languages: Mandarin (Native), English (Native Proficiency), French (DELFB1)

Programming Languages: R, MATLAB, Java

REFERENCES

Listed in chronological order

Broughton, Wayne, UBC Okanagan

Putnam Competition Organizer; Course Instructor

Email: wayne.broughton@ubc.ca

Tsopméné, Paul, UBC Okanagan

Research Supervisor; Directed Study Supervisor; Course Instructor

Email: paul.tsopmene@ubc.ca

Foxall, Eric, UBC Okanagan

Research Supervisor; Directed Study Supervisor; Course Instructor
Email: efoxall@mail.ubc.ca

Frankland, Martin, University of Regina

Summer School on Homotopy Colimits Organizer
Email: Martin.Frankland@uregina.ca