Nicholas Richardson
Curriculum Vitae

Institute of Applied Mathematics
311-6356 Agricultural Road
Vancouver, BC Canada V6T 1Z2
✉ *njericha@math.ubc.ca*
njericha.github.io

Research Interests

Audio & Signal Processing, Unsupervised Learning, and Tensor Factorizations

Education

Sep. 2022 – (Apr. 2026) **Doctor of Philosophy**, *University of British Columbia*, Vancouver, B.C.
Institute of Applied Mathematics, sup. by Michael Friedlander

Sep. 2020 – May 2022 **Master of Mathematics**, *University of Waterloo*, Waterloo, Ont.
A Sparse Random Feature Model for Signal Decomposition sup. by Giang Tran

Sep. 2016 – Apr. 2020 **Bachelor of Mathematics**, *University of Waterloo*, Waterloo, Ont.
Mathematical Physics Major, Pure Mathematics Minor

Employment

Sep. 2023 – (Apr. 2025) **Instructor**, *University of British Columbia*, Vancouver, B.C.
○ Calculus I (Fall 2023, Winter 2025)

Sep. 2022 – Dec. 2024 **Teaching Assistant**, *University of British Columbia*, Vancouver, B.C.
○ Calculus I (Fall 2024)
○ Calculus II (Winter 2023)
○ Calculus III (Fall 2022)

Sep. 2022 – Apr. 2024 **Mathematics Learning Centre Tutor**, *University of British Columbia*, Vancouver, B.C.

June 2020 – Dec. 2024 **Mathematics & Physics Tutor**, *Self-Employed*
High School and Undergraduate Levels

May 2019 – Aug. 2019 **Computational Fluids Research Assistant**, *University of Waterloo*, Waterloo, Ont.

Jan. 2018 – Dec. 2021 **Teaching Assistant**, *University of Waterloo*, Waterloo, Ont.
○ Mathematics of Music (Fall 2020, 2021)
○ Special Topics in Mathematical Connections: Math & Music (Fall 2021)
○ Complex Analysis (Winter 2020)
○ Calculus 1 & 2 (Fall 2019, Winter 2018, 2020, 2021)

May 2017 – Aug. 2017 **Software Engineering Research Assistant**, *McMaster University*, Hamilton, Ont.

Publications

Naomi Graham, **Nicholas Richardson**, Michael P. Friedlander, and Joel Saylor. Tracing Sedimentary Origins in Multivariate Geochronology via Constrained Tensor Factorization. *Mathematical Geosciences*, Feb. 2025.

Joel Saylor, **Nicholas Richardson**, Naomi Graham, Robert Lee, and Michael P. Friedlander. Tracking cu-fertile sediment sources via multivariate petrochronological mixture modelling of detrital zircons. 2024. (in review).

Michael L Waite and **Nicholas Richardson**. Viscous and diffusive generation of potential vorticity in stratified turbulence. In *AGU Fall Meeting Abstracts*, volume 2023, pages NG41A–06, 2023.

Michael L. Waite and **Nicholas Richardson**. Potential Vorticity Generation in Breaking Gravity Waves. *Atmosphere*, 14(5):881, 2023.

Nicholas Richardson, Hayden Schaeffer, and Giang Tran. SRMD: Sparse Random Mode Decomposition. *Communications on Applied Mathematics and Computation*, 2023.

Lam Si Tung Ho, **Nicholas Richardson**, and Giang Tran. Adaptive group Lasso neural network models for functions of few variables and time-dependent data. *Sampling Theory, Signal Processing, and Data Analysis*, 21(2):28, 2023.

Nicholas Richardson. A Sparse Random Feature Model for Signal Decomposition. *UWSpace*, 2022. (Master's Thesis).

Conference Presentations & Posters

Dec 2024	**Density Separation with Tensor Factorization**, *2024 CMS Winter Meeting*, Richmond, BC, Pres.
Oct 2024	**Density Separation with Tensor Factorization**, *2024 INFORMS Annual Meeting*, Seattle, WA, Pres.
Sep 2024	**Density Separation with Tensor Factorization**, *West Coast Optimization Meeting 2024*, Vancouver, BC, Pres.
July 2024	**Density Separation with Tensor Factorization**, *2024 SIAM Annual Meeting*, Spokane, WA, Pres.
Oct 2023	**Non-negative Tensor Decompositions for Unsupervised Learning**, *4th Biennial Meeting of SIAM Pacific Northwest Section*, Bellingham, WA, Pres.
June 2021	**Sparse Random Wavelet Representation & Decomposition**, *Canadian Applied and Industrial Mathematics Society (CAIMS)*, Waterloo, Ont., Poster Runner up in annual poster competition

Awards

Natural Sciences and Engineering Research Council of Canada

May 2023	Canadian Graduate Scholarship – Doctoral (330 awards nationwide)
May 2021	Canadian Graduate Scholarship – Master's (840 awards nationwide)
May 2019	Undergraduate Student Research Award (3 149 awards nationwide)

University of British Columbia

May 2022	Faculty of Science PhD Tuition Award
Sep. 2022	Four Year Doctoral Fellowship
Sep. 2022	President's Academic Excellence Initiative PhD Award

University of Waterloo

May 2021	President's Graduate Scholarship
Aug. 2020	K.D. Fryer Gold Medal
June 2020	Dean's Honours List With Distinction
May 2019	President's Research Award
Jan. 2019	Paul Berg Memorial Award
Jan. 2019	Arthur Beaumont Memorial Scholarship
Sep. 2016	President's Scholarship of Distinction
Sep. 2016	Alumni @ Microsoft Entrance Scholarship in Mathematics

Computer Skills

Julia, Python, MATLAB, Quarto, Typst, LaTeX, Adobe Software

Relevant Coursework

- Analysis (Functional, Numerical, Real/Complex)
- Convex Optimization
- Calculus of Variations
- Computational Audio
- Fourier to Wavelets
- Acoustics
- Fluid Mechanics
- Tensor Decompositions
- Probability
- Compressed Sensing