

# Nicholas Richardson

## Curriculum Vitae

Institute of Applied Mathematics  
311-6356 Agricultural Road  
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### Research Interests

Audio & Signal Processing, Unsupervised Learning, and Tensor Factorizations

### Education

- Sep. 2022 – **Doctor of Philosophy**, *University of British Columbia*, Vancouver, B.C.  
(Apr. 2026) Institute of Applied Mathematics, sup. by Michael Friedlander
- Sep. 2020 – **Master of Mathematics**, *University of Waterloo*, Waterloo, Ont.  
May 2022 *A Sparse Random Feature Model for Signal Decomposition* sup. by Giang Tran
- Sep. 2016 – **Bachelor of Mathematics**, *University of Waterloo*, Waterloo, Ont.  
Apr. 2020 Mathematical Physics Major, Pure Mathematics Minor

### Employment

- Sep. 2023 – **Instructor**, *University of British Columbia*, Vancouver, B.C.  
Apr. 2025
  - Calculus I (Fall 2023, Winter 2025)
- Sep. 2022 – **Teaching Assistant**, *University of British Columbia*, Vancouver, B.C.  
Dec. 2024
  - Calculus I (Fall 2024)
  - Calculus II (Winter 2023)
  - Calculus III (Fall 2022)
- Sep. 2022 – **Mathematics Learning Centre Tutor**, *University of British Columbia*,  
Apr. 2024 Vancouver, B.C.
- June 2020 – **Mathematics & Physics Tutor**, *Self-Employed*  
Dec. 2024 High School and Undergraduate Levels
- May 2019 – **Computational Fluids Research Assistant**, *University of Waterloo*,  
Aug. 2019 Waterloo, Ont.
- Jan. 2018 – **Teaching Assistant**, *University of Waterloo*, Waterloo, Ont.  
Dec. 2021
  - 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 – **Software Engineering Research Assistant**, *McMaster University*,  
Aug. 2017 Hamilton, Ont.

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## 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).

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## 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

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## 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

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## Computer Skills

Julia, Python, MATLAB, Quarto, Typst,  $\text{\LaTeX}$ , Adobe Software

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## 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