

JACOB SHKROB

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Education

New York University Ph.D. Mathematics	2022 – 2027 (expected)
McGill University B.Sc. Honors Probability & Statistics, Minor in Computer Science	2018 – 2022 CGPA: 3.92/4.00

Honors & Awards

Charles Newman Fellowship <i>New York University — awarded to an outstanding graduate student in probability</i>	2025
Finalist, Azrieli Visiting Ph.D. Fellowship <i>Azrieli Foundation</i>	2026
1 st Place & \$25,000, ProjectX Undergraduate AI Research Competition <i>Clinical practice cohort — personalizing mechanical ventilation via deep conservative reinforcement learning</i>	2022
Faculty of Science Merit Scholarship <i>McGill University — awarded in both 2019–2020 and 2020–2021</i>	2019 – 2021
Dean's Honors List <i>McGill University — awarded in both 2019–2020 and 2020–2021</i>	2019 – 2021
Winner, PharmaHacks (Novartis clinical trial data track) <i>Montreal Institute for Learning Algorithms (MILA)</i>	2019

Publications & Preprints

- [1] J. Niles-Weed, S. Sadosky, and J. Shkrob. An optimal constant for vector balancing with permutations. *arXiv:2610.02127*, 2026.
- [2] J. Niles-Weed and J. Shkrob. Nearly sharp comparison results for sliced and max-sliced Wasserstein distances. *arXiv:2608.13374*, 2026.
- [3] Y. Han, A. Shetty, and J. Shkrob. An empirical Bayes perspective on heteroskedastic mean estimation. *arXiv:2603.13499*, 2026.
- [4] J. Niles-Weed and J. Shkrob. Bayes-optimal estimation for Gaussian planted matchings. In preparation, 2026.
- [5] F. Kondrup, T. Jiralerspong, E. Lau, N. de Lara, J. Shkrob, M. D. Tran, D. Precup, and S. Basu. Towards safe mechanical ventilation treatment using deep offline reinforcement learning. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 37, pages 15696–15702, 2023.

Research Experience

AstraZeneca Student Researcher ↔ Dr. Natasha Markuzon, Dr. Damian Bikiel • Simulated time-to-event data exhibiting both predictive and prognostic behavior. Developed methods for inducing subgroup structure.	May 2022 – Aug 2022
McGill Institute for Computational Medicine (MICM) Summer Research Intern ↔ Prof. Yi Yang • Developed an algorithm for the time-varying Cox proportional hazards model, with applications to survival analysis and immunology. • Wrote R packages in C++/R using Rcpp, adding parallelism to cut running time.	May 2020 – Nov 2020 McGill University
Big Data Summer Institute (REU) Student Researcher ↔ Prof. Bhramar Mukherjee • Applied data mining and machine learning to genomic and phenotypic data with the goal of improving drug efficacy for individual cancer patients.	June 2019 – Aug 2019 University of Michigan

Conferences, Workshops & Summer Schools

Iliad Intensive *Participant (selected, funded)*

October 2026

↪ Iliad — Berkeley, CA

- Four-week intensive course in technical AI alignment and its mathematical foundations; admission based on mathematical strength.

Princeton Machine Learning Theory Summer School *Participant/Presenter*

August 2026

↪ Princeton University

- Doctoral training in theoretical machine learning, training dynamics, and diffusion models.

Conference of Learning Theory *Participant*

June 2026

↪ University of California San Diego

- Presented work on empirical Bayes for heteroskedastic mean estimation.

Workshop on Robust Statistics *Presenter*

April 2026

↪ Columbia University

- Presented work on empirical Bayes for heteroskedastic mean estimation.

Statistical Optimal Transport Summer School *Participant*

June 2025

↪ Simons Laufer Mathematical Sciences Institute

- Doctoral training in statistical optimal transport methodology.

Methods in Single-Cell Data Integration and Optimal Transport *Participant*

June 2025

↪ Irving Institute for Cancer Dynamics

- Multi-modal single-cell integration; emerging spatial and imaging technologies.

Statistical and Numerical Methods for Non-commutative Optimal Transport *Participant*

May 2025

↪ Institute for Pure & Applied Mathematics (UCLA)

- Numerical algorithms for optimal transport and gradient flows.

Emerging Directions Workshop, NITMB *Participant*

Feb 2025

↪ University of Chicago

- Discussed open problems in mathematical biology presented by leading researchers.

Probability, Algorithms and Inference *Participant*

Summer 2024

↪ Georgia Institute of Technology

- Combinatorics of the perceptron model, planted subgraph recovery, sphere packing.

51st Probability Summer School, Saint-Flour *Participant*

Summer 2023

- Bayesian nonparametric statistics, stochastic homogenization, integrable systems.

Projects & Extracurriculars

Moral Flocking: Do AI Groups Tend Toward Consensus? *Hackathon Project (with R. Budiono)*

Oct 2026

↪ 3rd Place at AI Swarm Dynamics Hackathon — AI Village & Grove Research

- Tested whether LLM agents converge on moral consensus: 12 models from 6 providers debated MoReBench dilemmas over three forum rounds, with private opinions scored by an AI judge.
- Found discussion-driven convergence vs. a control condition, and that collective opinion was robust to over-representation and planted-persuader steering interventions.
- Prize of \$500.

PharmaHacks — Novartis Clinical Trial Data *Winning Project*

Fall 2019

↪ Montreal Institute for Learning Algorithms (MILA)

- Built random forest, naïve Bayes and XGBoost classifiers in `scikit-learn` and `pandas`.
- Used χ^2 tests of independence, ANOVA and bagging/boosting for feature and model selection.

Directed Reading Project *Undergraduate Project*

Fall 2020

- *Probabilistic analysis of simple random graph models.*

Technical Skills

Programming	Python, R, C++, Java, MATLAB, OCaml, Bash (<i>learning Julia</i>)
Tools	L ^A T _E X, PyTorch, tidyverse, ggplot2, R Markdown, Git/GitHub, Vim, Anaconda, Excel
Methods	Statistical modeling, data wrangling and cleaning, survival analysis, ML pipelines
Languages	English, Russian, French, Hebrew (<i>basic</i>)