curriculum vitæ of

Alin Morariu

COMPUTATIONAL EPIDEMIOLOGY · BAYESIAN INFERENCE & STATE TRANSITION MODELS · GPU COMPUTING
BIO-STATS · PROBABALISTIC LEARNING

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 Google Scholar   in LinkedIn   Research Gate

EDUCATION

Jan. 2022 – Dec. 2025	**Ph.D.** Statistics	LANCASTER UNIVERSITY

Thesis: Probabilistic programming for stochastic infectious disease models
Supervisor: Professor Christopher Jewell, Professor Paul Fearnhead

Sept. 2019 – July 2021	**M.Sc** Applied Mathematics	TORONTO METROPOLITAN UNIVERSITY

Thesis: Financial Bandits - Development of Thompson Sampling for Financial Data
Supervisor: Professor You Liang

Sept. 2014 - June 2019	**Honours B.Sc.** Statistics Specialists, Mathematics Minor	UNIVERSITY OF TORONTO

Capstone Project: Bayesian model comparisons via numerical summaries of Probability Integral Transforms
Supervisor: Professor Daniel Simpson

AWARDS AND FUNDING

2025	TakeAIM 2025 Finalist	SMITH INSTITUTE

Competition showcasing academic research in an industry setting to showcase the role mathematics and data science play in solving real-world problems

2022-2025	Fully funded PhD studentship	LANCASTER UNIVERSITY

School of Mathematical Sciences via Engineering and Physical Sciences Research Council (EPSRC)

2019-2021	Ryerson Graduate Fellowship	TORONTO METROPOLITAN UNIVERSITY

Department of Mathematics

2019-2021	Graduate Development Award (GDA)	TORONTO METROPOLITAN UNIVERSITY

Department of Mathematics

2019-2021	Mathematics Graduate Award	TORONTO METROPOLITAN UNIVERSITY

Department of Mathematics

2014-2019	Trails Dion Bursary for Post Secondary School	TRAILS YOUTH INITIATIVES

TEACHING EXPERIENCE

LECTURING

2024 - Present	IDDinf course organizer	LANCASTER UNIVERSITY

Core organizer for 5 day short-course on inference methods for infectious disease models. Role involved designing, writing, and lecturing on Bayesian inference methods for infectious disease modelling. Course was attended by 15 PhD students and research fellows from institutions across the United Kingdom. The second edition of the short course is scheduled for summer 2026.

TEACHING ASSISTANT

Apr. 2022 – present	Department of Mathematics	LANCASTER UNIVERSITY

Courses Taught:
Undergraduate: MATH103 (Probability), MATH104 (Statistics), MATH105 (Linear Algebra), MATH230 (Probability), MATH330 (Likelihood), MATH331 (Bayesian Statistics), MATH333 (Statistical Models), MATH336 (Machine Learning), MATH338 (Time Series Analysis)
Graduate: MATH403 (Statistical Foundations I), MATH404 (Statistical Learning), MATH454 (Survival Analysis), MATH553 (Longitudinal Data), SCC461 (Programming for Data Science)

Sept. 2019 – present	**Department of Mathematics**	RYERSON UNIVERSITY

Courses taught:
MTH110 - Discrete Mathematics I, MTH380 - Probability and Statistics I, MTH410 -Statistics

Jan. 2018 – June 2019	**Department of Statistics**	UNIVERSITY OF TORONTO

Courses taught:
STA130 - An Introduction to Statistical Reasoning and Data Science, STA302 - Methods of Data Analysis I, STA314 - Statistical Methods for Machine Learning I

PROFESSIONAL EXPERIENCE

INDUSTRY

May 2020 – Dec 2021	**Data Science Intern**	ONTARIO TEACHER'S PENSION PLAN

- Implemented machine learning models to forecasting trading costs for futures contracts and options
- Provided detailed reports of historical trade performance on futures contracts and options trades

Sept. 2017 – Dec 2017	**Actuarial Analyst - Consumer Market Pricing**	MANULIFE FINANCIAL

- Standardized pricing models across health, dental, and travel products to eliminate need of per-product updates when repricing
- Revitalized travel pricing methodology using fundamental machine learning techniques to predict claims and highlight risk factors

May 2017 - Aug. 2017	**Investment Consulting Analyst**	MERCER (CANADA) LIMITED

- Monitored quarterly performance of funds with a keen focus on past results in order to optimize asset allocation of institutional clients
- Automated daily data entry process with VBA Macros to half run time of asset reconciliation

Jan. 2016 - May 2016	**Pension Consulting Analyst**	MERCER (CANADA) LIMITED

- Performed funding valuation to determine updated liabilities resulting in savings of $100,000 annually
- Linearized single benefit and PSPA calculations with the creation of an Excel-based calculator to reduce manual calculations by 90%

RESEARCH ASSISTANT

May 2019 - Aug. 2019	**Summer Research Student**	ST. MICHAEL'S HOSPITAL

- Authored R package `psmplr` to perform posterior distributions sampling of random effects in spatio-temporal air pollution models
- Construct global envelopes for time-varying predictive intervals of pollutant random effect

Jan. 2018 - May 2019	**Research Assistant - Department of Statistics**	UNIVERSITY OF TORONTO

- Evaluate effectiveness of the university's statistics program and course offerings to update curriculum

Jan. 2018 - May 2018	**Research Assistant - Risk Lab**	UNIVERSITY OF TORONTO

- Develop quantitative methodology to construct a financial index for cryptocurrencies to monitor asset class performance

COMMITTEES

2023 - Present	**Computing Committee student representative**	LANCASTER UNIVERSITY

Act as a representative on the Department's computing committee to ensure graduate students had access to appropriate computing resources to facilitate the diverse research agendas

2025 - Present	**LURGiE Seminar series co-organizer**	LANCASTER UNIVERSITY

Arrange and organize talks aligning with research group's interests and future direction. Foster collaboration between methodological (School of Mathematical Sciences) and applied (Medical School and Health Data Science) researchers

SKILLS

Programming:

- **Python** (packages include numpy, pandas, scikit-learn, TensorFlow, JAX, matplotlib)
- **R** (packages include tidyverse, tidybayes, INLA, timeseries, TSA, Matrix)
- **Stan** (probabilistic programming language for Bayesian inference with MCMC sampling)

Languages:

- English (native proficiency), Romanian (native proficiency)

PUBLICATIONS

Publications marked with † are in pre-print.

JOURNAL PUBLICATIONS

1. Dr. Kamal Rai, Prof. Patrick Brown, Alin Morariu, Dr. Hwashin Hyun Shin. (2021)
   Detection of Temporal Trends in Association between Air Pollution and Public Health †
   Submitted to Communications in Statistics: Case Studies, Data Analysis and Applications

2. Ethan Johnson-Skinner, Dr. You Liang, Dr. Na Yu, Alin Morariu (2021)
   A Novel Algorithmic Trading Strategy using Hidden Markov Model for Kalman Filtering Innovations
   2021 IEEE 45th Annual Computers, Software, and Applications Conference (COMPSAC)

PREPRINTS

3. Alin Morariu, Dr. Jess Bridgen, Dr. Chris Jewell (2025)
   `gemlib`*: probabilistic programming for epidemic models*†
   Available at: arXiv:2511.08124

MANUSCRIPTS IN PREPARATION

3. Alin Morariu, Dr. Chris Jewell
   Composable MCMC kernels for accelerated within-Gibbs sampling algorithms

POSTERS AND INVITED TALKS

4. JUNIPER annual meeting (April 2025) - Composable MCMC algorithms
   Joint UNIversities Pandemic and Epidemiological Research (JUNIPER)

5. ISVEE17 - Joint geo-spatial and epidemic modelling of wild bird-poultry farm transmission of HPAI (Nov. 2024)
   Internation Symposium on Veterinary Epidemiology and Economics

6. LURGiE Seminar - Functional programming for implementing MCMC algorithms (Jan. 2024)
   Lancaster University Research Group in Epidemics

7. Epidemics9 - Developing a generalized epidemic modeling language in Python (Nov. 2023)
   Epidemics - 9th International Conference on Infectious Disease Dynamics

8. Celebration of Science (April 2024) - Probabilistic programming languages for implementing stochastic epidemic models
   Lancaster University

Software and packages

1. `gemlib` - scientific compute library build for epidemic analysis
   Project can be seen on GitLab

2. `psmplr` - sampling posterior distributions of a sparse random effect of a mixed effect
   models from INLA
   Project can be seen on GitHub

Extracurricular Activities

2019 - 2021	R Workshop for STEM Students	Ryerson University
2017 - 2020	Mentor and Guest Speaker	Trails Youth Initiatives
2017-2019	President & External Relations Executive, Romanian Student Club	University of Toronto
2013-2016	Volleyball Coach	Victoria Park C.I.