Jackie Lok

Curriculum vitae — Last updated Aug 2024

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Address: Princeton University
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Education

Princeton University, *Princeton, NJ, USA*
Ph.D. in Operations Research and Financial Engineering — 2021–
Adviser: Elizaveta Rebrova

M.A. in Operations Research and Financial Engineering — 2023

UNSW Sydney, *Sydney, Australia*
Bachelor of Science (Honours) in Pure Mathematics — 2020
with First Class Honours and the University Medal
Supervisor: Catherine Greenhill
WAM: 97.16/100

Bachelor of Actuarial Studies (Co-op) in Mathematics with Distinction — 2016–2019
WAM: 95.65/100

Wharton School, University of Pennsylvania, *Philadelphia, PA, USA*
International Exchange Semester, GPA: 4.00/4.00 — 2017

Research Interests

My research is broadly in the mathematics of data science. I study the properties and behaviour of random mathematical structures and algorithms, and aim to use these insights to develop tools and models that allow us to better work with and understand large-scale, complex data.

My research interests mainly lie at the intersection of probability, statistics and optimisation. More specifically, my interests include high-dimensional probability, random matrices, randomised algorithms, numerical linear algebra, and machine learning.

Awards & Honours

- Quad Fellowship, Schmidt Futures — 2023
- Richard Stillwell '21 *24 and Agnes Newhall Stillwell Fellowship, Princeton University — 2021
- University Medal in Pure Mathematics, UNSW Sydney — 2020
- H.C. & M.E. Porter Memorial Scholarship, UNSW Sydney — 2020
- The Faculty of Science Prize for Honours Year Science, UNSW Sydney — 2020
- The George Szekeres Prize, UNSW Sydney — 2019
- The Head of School's Prize, UNSW Sydney — 2019
- UNSW Co-op Scholarship in Actuarial Studies — 2016–2019
- UNSW Scientia Scholarship — 2016–2019
- Harry Manson International Exchange Scholarship, UNSW Sydney — 2017

Publications

Preprints

- Jackie Lok, Rishi Sonthalia, and Elizaveta Rebrova. "Discrete error dynamics of mini-batch gradient descent for least squares regression" (2024). arXiv: 2406.03696.
- Rishi Sonthalia, Jackie Lok, and Elizaveta Rebrova. "On Regularization via Early Stopping for Least Squares Regression" (2024). arXiv: 2406.04425.
- Roxanne He and Jackie Lok. "On Approximating the Potts Model with Contracting Glauber Dynamics" (2024). arXiv: 2404.18778.

Journal articles

- Jackie Lok and Elizaveta Rebrova. "A subspace constrained randomized Kaczmarz method for structure or external knowledge exploitation". *Linear Algebra and its Applications* 698 (2024), pp. 220–260. DOI: 10.1016/j.laa.2024.06.010. arXiv: 2309.04889.

Miscellaneous

- Jackie Lok. *Markov chains, mixing times, and cutoff.* Honours thesis. 2020.

Talks and Presentations

- NSF CompMath PI Meeting, University of Washington, Seattle: "A Subspace Constrained Randomized Kaczmarz Method for Structure or External Knowledge Exploitation" (Poster) — Jul 2024
- Graduate student probability reading group, Princeton University:
  "Concentration for Random Matrix Products" — Oct 2023
  "Matrix Concentration Inequalities via the Method of Exchangeable Pairs" — Nov 2022
- Honours presentation, UNSW Sydney: "Mixing times of Markov chains and the cutoff phenomenon" — Nov 2020

Teaching

Princeton University, *Princeton, NJ, USA*

Assistant in Instruction, ORFE Department

Responsible for delivering weekly precepts, holding office hours, grading problem sets and exams, and general course admin.

- ORF 526: Probability Theory — Fall 2024
- ORF 387: Networks — Spring 2024
- ORF 363: Computing and Optimization — Fall 2023
- ORF 350: Analysis of Big Data — Spring 2023
- ORF 387: Networks — Fall 2022

University of Melbourne, *Melbourne, Australia*

Academic Tutor, School of Mathematics and Statistics

Responsible for delivering weekly tutorials and marking assessments.

- MAST20004: Probability — Semester 1 2021

UNSW Sydney, *Sydney, Australia*

Academic Tutor, School of Risk and Actuarial Studies

Responsible for delivering weekly tutorials, marking exams and assessments, developing course materials, holding student consultations, and providing general course support.

- ACTL3162: General Insurance Techniques — Term 3 2020
- ACTL2102: Foundations of Actuarial Models — Term 2 2020
- ACTL2111: Financial Mathematics for Actuaries — Term 1 2020
- ACTL1101: Introduction to Actuarial Studies — Term 3 2019
- ACTL2102: Foundations of Actuarial Models — Term 2 2019
- ACTL3141: Actuarial Models and Statistics — Term 1 2019

Other Activities

Mentoring

- McGraw Graduate Teaching Fellow, *Princeton University* — 2024–
- ReMatch mentor, *Princeton University* — 2023
- ORFE Senior Thesis Writer's Group co-leader, *Princeton University* — 2022–2023
- Drop-in Centre tutor, *School of Mathematics and Statistics, UNSW Sydney* — 2020

Reviewing

Linear Algebra and its Applications

Work Experience

icare, Actuarial Services Intern, *Sydney, Australia* — Aug 2018–Feb 2019

Supported the provision of actuarial advice and analysis for the NSW state insurer. Assisted with the reporting and valuation of outstanding claims liabilities, scenario analysis, preparation of financial budgets, claims experience monitoring, and the assessment of data quality and integrity.

Suncorp Group, Natural Perils Pricing Intern, *Sydney, Australia* — Feb 2018–Aug 2018

Collaborated in the research and development of a new natural peril pricing model in Python using analytical and machine learning techniques with insurance and geospatial datasets. Developed interactive tool using SAS and Python to identify and visualise exposure concentration risks as part of an automated monitoring pipeline.

MetLife Australia, Capital and Valuation Intern, *Sydney, Australia* — Nov 2016–Feb 2017

Assisted with financial reporting, reserving and scenario analysis for group life insurance.

Languages and skills

Languages

English (native), Cantonese (fluent), Mandarin (beginner), German (beginner).

Computing

- Proficient with Python. Experience with other programming languages including Julia, R, Java, MATLAB, SQL, and SAS.

– Competent with LaTeX.

– Experience with Microsoft Excel, Word, and PowerPoint.

Online courses

– Probabilistic Graphical Models Specialization (Coursera, Stanford University) 2021

– Deep Learning Specialization (Coursera, DeepLearning.AI) 2021

– Machine Learning (Coursera, Stanford University) 2018