

# JACOB KELLY

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## EDUCATION

### University of Toronto

Toronto, ON

Computer Science, Math, Stats · **cGPA: 3.93/4 Course Average: 90%**

Sep 2017 — Jun 2022

Recipient of more than \$11,000 in scholarships and grant funds.

Coursework: Machine Learning (Graduate-Level) · Advanced Algorithms & Data Structures ·  
Advanced Differential Equations · Stochastic Processes · Molecular Biology

Teaching Assistant: STA414/2104 (Machine Learning) · Ran office hours and graded assignments

## EXPERIENCE

### Machine Learning Research Intern · Python · TensorFlow · Keras · Bash · Git

Toronto, ON

Deep Genomics

Sep 2020 — Apr 2021

- Reducing the memory footprint of models for predicting splicing from genome sequence.

### Machine Learning Researcher · Python · JAX · PyTorch · Bash · Git · $\LaTeX$

Toronto, ON

Vector Institute for AI · Supervisor: David Duvenaud

Sep 2019 — Aug 2020

- Analyzed bias of estimator for scalable entropy-regularized training of Energy-Based Models (EBMs). Cleaned data and tuned EBM performance on semi-supervised classification of tabular data.
- Implemented Taylor-mode automatic differentiation rules in JAX for regularizing higher derivatives of Neural Ordinary Differential Equations (Neural ODEs) to be easier to solve. Implemented and numerically tested ODE solvers of different orders in JAX. Ran experiments.

### Computational Biology Researcher · R · MATLAB · Bash · Git

Toronto, ON

Princess Margaret Cancer Research · Supervisor: Benjamin Haibe-Kains

Apr 2019 — Sep 2019

- Developed R package for benchmarking machine learning methods for inferring sample-specific gene regulatory networks from single-cell RNA sequencing (scRNA-Seq) data.

### Computer Vision Software Developer · SPEL+ (internal C++ wrapper) · SVN

Markham, ON

Epson Research and Development Lab

May 2018 — Aug 2018

- Optimized motored stage movements and performed image capture and evaluation asynchronously, supporting researchers by improving speed of data collection by 58%.

## PUBLICATIONS

- Will Grathwohl\*, **Jacob Kelly\***, Milad Hashemi, Mohammad Norouzi, Kevin Swersky, David Duvenaud, “No MCMC for me: Amortized sampling for fast and stable training of energy-based models”. Preprint, in submission.
- Jacob Kelly\***, Jesse Bettencourt\*, Matthew James Johnson, David Duvenaud, “Learning Differential Equations that are Easy to Solve”.  
**Neural Information Processing Systems (NeurIPS) 2020**

## PROJECTS

### JAX (Open-source contributor) · Python · Git

github.com/google/jax

- Top 10% of contributors (25 commits) since April 2020. Implemented Taylor-mode automatic differentiation rules and wrote numerical tests. Fixed bugs in numerical differential equation solvers.

## AWARDS

Undergraduate Student Research Award, NSERC Canada

2020

Dorothy Helen McRobb Scholarship

2019

David L. Squires Foundation Scholarship

2019

Margaret Ronald & Thomas Paxton Taylor Scholarship in Mathematics

2019

Distinction (Top 15%), Euclid National Mathematics Contest, Univ. of Waterloo

2017

1st Place, ECOO Central Ontario Programming Contest

2017

## SKILLS

### Languages:

Python · Bash · Git ·  $\LaTeX$  · C/C++ · R · Java

### Machine Learning Frameworks:

JAX · PyTorch · TensorFlow · Keras · NumPy · scikit-learn

## INTERESTS

### Extracurricular

Computer Science First-Year Learning Community Mentor

### Miscellaneous

3Blue1Brown · Nerdwriter · Ted Chiang · Westworld · Rock Climbing · Running