

# DEXTER BARROWS

## CURRICULUM VITAE

About <https://dexter.barrows.io>

Contact [dexter@barrows.io](mailto:dexter@barrows.io)

### *Education*

#### **Doctor of Philosophy – Mathematics**

Ryerson University      Present

Research      Stochastic biochemical networks  
Supervisors    Dr. Silvana Ilie & Dr. Katrin Rohlf  
Languages      R, C++

#### **Master of Science – Applied Mathematics**

McMaster University      2016

Thesis          *A Comparative Study of Techniques for Estimation and Inference of Nonlinear Stochastic Time Series*  
Supervisor      Dr. Ben Bolker  
Link              <https://github.com/dbarrows/epidemic-forecasting>  
Languages      R, C++  
Frameworks     CUDA

#### **Bachelor of Science – Mathematics / Computer Science**

Ryerson University      2014

Thesis          *Software for Multi-level Monte-Carlo Simulation of Stochastic Biochemical Kinetics*  
Supervisor      Dr. Silvana Ilie  
Link              <https://github.com/dbarrows/biochemical-kinetics>  
Languages      MATLAB  
Frameworks     CUDA

### *Experience*

#### **Graduate Assistant**

Ryerson University      2019–Present

Run tutorials and labs, and invigilate and grade quizzes and tests.  
Courses          Numerical Analysis

#### **Software Developer**

7D Surgical      2017–2019

Developed software components for medical embedded systems, with a focus on algorithms for GPU-accelerated 3D image processing and UI design.  
Languages      C#, C++  
Frameworks     CUDA, WPF

#### **Research Assistant**

Biophotonics and Bioengineering Laboratory (BBL)      2015–2017

Designed algorithms for GPU-accelerated medical image processing and semi-automated anatomical segmentation.  
Languages      C++, MATLAB  
Frameworks     CUDA

**Teaching Assistant**

McMaster University 2014–2016

Ran tutorials and labs, and invigilated and graded tests and exams.

Courses Introduction to Scientific Computing, Calculus for Life Sciences

Languages Python

**Data Analyst**

Canadian Society of Association Executives (CSAE) 2013

Performed data sourcing, verification, and analysis.

**Math / Science Tutor**

The Math Guru 2010–2014

***Awards*****Postgraduate Scholarship – Doctoral (PGS D)**

NSERC 2020–2023

National scholarship supporting high-calibre scholars who are engaged in doctoral programs in the natural sciences or engineering.

**Queen Elizabeth II – Science and Technology (QEII-GSST)**

Ryerson University 2019–2020

Provincial merit-based scholarship for students in a graduate research-based programs in a science and technology discipline.

***Publications******A Software Ecosystem for Stochastic Biochemical Network Simulation in R (proposal submitted)***

SIAM / CAIMS Annual Meeting 2020

Authors D Barrows, K Rohlf, S Ilie

***Optical coherence tomography for dynamic axial correction of an optical end-effector for robot-guided surgical laser ablation***

Optical Engineering 2019

Authors J Jivraj, C Chen, D Barrows, VXD Yang

Link <https://doi.org/10.1117/1.0E.58.5.054106>***Optimization of laser osteotomy at 1064 nm using a graphite topical absorber and a nitrogen assist gas jet***

Biomedical Optics Express 2019

Authors J Jivraj, D Barrows, X Gu, VXD Yang

Link <https://doi.org/10.1364/BOE.10.003114>***Graphics processor unit acceleration enables realtime endovascular Doppler optical coherence tomography imaging***

SPIE Photonics West 2017

Authors D Barrows, B Vuong, K Lee, J Jivraj, VXD Yang

Link <https://doi.org/10.1117/12.2254930>***Graphics processor unit acceleration enables realtime endovascular Doppler optical coherence tomography imaging: development and validation***

SPIE Photonics West 2017

Authors D Barrows, JM Ramjist, B Vuong, K Lee, J Jivraj, VXD Yang

Link <https://doi.org/10.1117/12.2256623>

*Assessment of hemodynamics of intracranial aneurysms using Doppler optical coherence tomography in patient specific phantoms: preliminary results* SPIE Photonics West 2017

Authors JM Ramjist, J Jivraj, D Barrows, B Vuong, R Wong, VXD Yang

Link <https://doi.org/10.1117/12.2256532>

## Software

**rendr** R, C++ 2020

An R package for simulating reaction and reaction-diffusion systems.

Link <https://dexter.barrows.io/code/R-Packages/rendr>

**mountie** R, C++ 2020

An R package providing an efficient C++ implementation of the Reactive Multi-Particle Collisions (RMPC) algorithm.

Link <https://dexter.barrows.io/code/R-Packages/mountie>

**bondr** R, C++ 2020

Provides utilities and classes for working with reaction networks in R.

Link <https://dexter.barrows.io/code/R-Packages/bondr>

**emplot** R 2020

A clean theme for ggplot2 with matching geom defaults.

Link <https://dexter.barrows.io/code/R-Packages/emplot>

**MARS** MATLAB 2014

MATLAB code for simulating well-stirred biochemical systems.

Link <https://github.com/dbarrows/biochemical-kinetics/tree/master/code>

## Certifications

**Data Science** University of Toronto 2018–Present

Modelling, visualisation, big data, and machine learning.

Languages Python

Frameworks scikit-learn

**LBR iiwa – Commissioning and Programming** KUKA College 2017

Operation and programming of the KUKA LBR iiwa personal robotic assistant, including safe interaction, manual operation, basic maintenance, authoring robotic applications, and debugging.

Languages Java

## Leadership

**President, Mathematics Course Union (MCU)** Ryerson University 2013–2014

Acted as a liaison between students, the Department of Mathematics, and the Faculty of Science.

Committees Curriculum Advising Committee, By-law Revising Subcommittee, Ryerson Science Society (RSS) Steering Committee