

# Yue Liu

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## Academic Interests

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- Modelling of biological systems with partial differential equations (PDEs) and agent-based models
- Numerical analysis, asymptotic analysis, bifurcation and dynamical behaviors of PDEs
- Combining machine learning approaches with mechanistic modelling toward optimal control of biological systems

## Technical Skills

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- Proficient in: Java, C, C++, Python, Matlab, Julia, Scheme/Racket.
- Intermediate experience with: R, Perl, JavaScript, PHP, Bash scripting, SQL
- Comfortable with version control: Git, SVN, Mercurial

## Education

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### University of Oxford

*Doctor of Philosophy*

Mathematics, focus on PDE and statistical modelling of biological systems. Supervised by Prof. Ruth Baker and Prof. Philip Maini

Oxford, UK

2019–present

### University of British Columbia

*Master of Science*

Applied Mathematics, focus on mathematical modelling and analysis of biological systems. Graduating average 93.2% (A+). Supervised by Prof. Leah Edelstein-Keshet

Vancouver, BC, Canada

2017–2019

### University of Waterloo

*Bachelor of Mathematics (Honours, Co-op)*

Double major in Computer Science and Mathematical Physics, minor Pure Mathematics, Graduated with overall average 95.5% and With Distinction – Dean's Honours List

Waterloo, ON, Canada

2012–2017

### Fort Richmond Collegiate

*High school*

Graduated with Magna Cum Laude, final average 98%

Winnipeg, MB, Canada

2009–2012

## Selected Awards and Scholarships

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- Canadian Centennial Scholarship, 2021. Awarded by Canadian Centennial Scholarship Fund
- Canada Postgraduate Scholarships – Doctoral (PGS-D), 2019. Natural Sciences and Engineering Research Council of Canada (NSERC)
- Canada Graduate Scholarships-Master's (CGS-M), 2017. NSERC
- R Howard Webster Foundation Fellowship, 2017. University of British Columbia (UBC)
- Faculty of Science Graduate Award, 2017-2018. UBC
- Lloyd Switzer Scholarship in Applied Mathematics, 2017. University of Waterloo (UW)
- Arthur Beaumont Memorial Scholarship, 2016. UW
- Frank Goodman Memorial Scholarship, 2015. UW
- University of Waterloo Descartes National Scholarship, 2012-2016. UW

## Publications

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**Yue Liu**, Philip K Maini, and Ruth E Baker. Control of diffusion-driven pattern formation behind a wave of competency. *arXiv preprint arXiv:2110.07990*, 2021 (in review).

Dario Domingo, Stanislaw Biber, Gabriele Dian, Patrick Dorey, Kays Haddad, Paul Heslop, Ingrid Holm, **Yue Liu**, and Raymond Pang. Trans-national equitable strategies of vaccine distribution during the covid-19 pandemic. *Mathematics in Industry Reports*, 2021.

**Yue Liu**, Elisabeth G Rens, and Leah Edelstein-Keshet. Spots, stripes, and spiral waves in models for static and motile cells. *Journal of Mathematical Biology*, 82(4):1–38, 2021.

Andreas Buttenschön, **Yue Liu**, and Leah Edelstein-Keshet. Cell size, mechanical tension, and GTPase signaling in the single cell. *Bulletin of Mathematical Biology*, 82(2):28, 2020.

**Yue Liu**. Analysis of pattern formation in reaction-diffusion models for cell polarization. Master's thesis, University of British Columbia, 2019.

**Yue Liu**, John Milton, and Sue Ann Campbell. Outgrowing seizures in childhood absence epilepsy: time delays and bistability. *Journal of Computational Neuroscience*, 46(2):197–209, 2019.

Priyank Jaini, Abdullah Rashwan, Han Zhao, **Yue Liu**, Ershad Banijamali, Zhitang Chen, and Pascal Poupart. Online algorithms for sum-product networks with continuous variables. In *Conference on Probabilistic Graphical Models*, pages 228–239, 2016. [proceedings.mlr.press/v52/jaini16.pdf](https://proceedings.mlr.press/v52/jaini16.pdf).

## Work Experience

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### **St Hugh's College**

*Stipendiary Lecturer*

**Oxford, UK**

*January 2020–Present*

Taught tutorials for Numerical Analysis, Mathematical Biology, and Metric Spaces and Complex Analysis.

### **University of Oxford**

*Teaching Assistant (2019–2020), Tutor (2020–)*

**Oxford, UK**

*October 2019–Present*

Responsible for grading and assisting tutorials for Theory of Deep Learning, Mathematical Physiology and Stochastic Analysis and PDEs. Taught classes for Mathematical Biology.

### **University of British Columbia**

*EDUCE Teaching Assistant*

**Vancouver, BC Canada**

*September 2018–April 2019*

Responsible for developing curriculum and delivering data science workshops for the Experiential Data science for Undergraduate Cross-disciplinary Education (EDUCE) program.

### **University of Waterloo**

*USRA Undergraduate Researcher*

**Waterloo, ON, Canada**

*January–August 2017*

Developed and analyzed delay differential equation models for neuronal systems for explaining the onset and outgrowth of childhood absence epilepsy.

### **Facebook, Inc.**

*Software Engineer (intern)*

**Menlo Park, CA, USA**

*May–August 2016*

Implemented new database schema and interface for efficient storage of records. Developed new machine learning model for messaging inactive users, which significantly improved user retention.

## **Agriculture and Agri-Food Canada**

*Bioinformatics Software Developer*

Developed the Genomics and Transcriptomics Analysis pipeline. Utilized bioinformatics softwares to analyze fungal pathogens on crops.

**Ottawa, ON, Canada**

*May–August 2014*

## **Presented Seminars**

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- Modelling the dynamics of GTPase activity. Mathematical Biology Seminar, Pacific Institute for the Mathematical Sciences, Vancouver, Canada, 2018/11/07
- Mathematical Modelling in Biology. Member's Series, Green College, UBC, Vancouver, Canada, 2018/12/03

## **Selected Conferences and Workshop participation**

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Delivered oral and/or poster presentations on various topics:

- **Society for Mathematical Biology Annual Conference**, Virtual, June 2021
- **SIAM UK Student Chapter Conference**, Virtual, June 2021
- **European Study Group with Industry (ESGI)**, Virtual, Apr 2021
- **Society for Mathematical Biology Annual Conference**, Virtual, Aug 2020
- **SIAM/CAIMS Annual Meeting (AN20)**, Virtual, July 2020
- **Canadian Applied and Industrial Mathematics Society Annual Meeting**, Whistler, Canada, June 2019
- **SIAM Conference on Applications of Dynamical Systems (DS19)**, Snowbird, Utah, USA, May 2019
- **Canadian Mathematical Society Winter Meeting**, Vancouver, Canada, Dec.2018
- **PIMS Workshop on Stochastic and Deterministic Modelling in Biology**, Jasper, Canada, Sept.2018
- **PIMS Industrial Problem Solving Workshop**, U of Calgary, Canada, August 2018
- **Mechanobiology Symposium: The Mechanome in Action**, UC Irvine, USA, July 2018
- **BC Data Science Workshop**, UBC, Canada, June 2018
- **Biophysical Society of Canada Annual Meeting**, Simon Fraser University, Canada, May 2018
- **Canadian Undergraduate Mathematics Conference**, Montreal, Canada, July 2017
- **Undergraduate Applied Mathematics Conference**, University of Western Ontario, Canada, March 2017