

# Mariah C. Boudreau, Ph.D.

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## Professional Summary

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An organized and enthusiastic computational scientist with 5 years of experience in stochastic modeling and simulations. I am eager to work on complex research questions that leverage computational methods.

## Education

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**University of Vermont** | Burlington, VT  
Aug. 2019 - Aug. 2024  
Ph.D. in Mathematical Sciences

**Saint Michael's College** | Colchester, VT  
Aug. 2015 - May 2019  
B.S. in Mathematics  
Minors in Computer Science and Statistics

## Skills

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**Coding:** Python (numpy, pandas, matplotlib, geopandas), parallelization, Git, LaTeX, RStudio, SQL.

**Technical material:** Probability theory, Statistical analysis (linear and logistic regression), Branching process theory, Stochastic simulations, Machine learning techniques.

## Work Experience

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**Postdoctoral Researcher** | The Roux Institute at Northeastern University, Portland, ME  
Sept. 2024 - Present

- Constructing Python workflows for airline travel network database cleaning and surveillance optimization on this network.
- Extending this workflow to include global surveillance optimization for high-risk spillover regions.
- Collaborating with the CDC on optimizing disease surveillance systems in the US.
- Prepared global maps of disease detection for specific surveillance locations to showcase the capabilities of our analysis for a presentation with collaborators.
- Established a postdoctoral researcher affinity group to connect this community within the Roux research vertical.

**Ph.D. Candidate** | University of Vermont, Burlington, VT  
Aug. 2019 - Aug. 2024

- Conducted research addressing uncertainties in within-host and population-level disease dynamics for my dissertation.
- Developed a mechanistic model using master equations to estimate human papillomavirus (HPV) viral load parameters for a population-level model.
- Extended a time-dependent probability generating function model to incorporate two intervention strategies, and concisely conveyed the results with four intervention comparison metrics.
- Presented chapters of my dissertation research at two conferences.
- Processed blood work and health history survey data for the Lived Experience Measured Using Rings Study.

- Performed a regression analysis to understand the relationship between an individual's blood work and their OURA Ring Gen3 sleep data, segmented by their history of chronic conditions.

**Contractor** | Institute for Disease Modeling at the Gates Foundation, Seattle, WA

May 2022 - July 2022

- Assisted in parameterizing and developing an open-source HPV population model with the Computational Science Research group.
- Studied the agent-based model framework developed at the Institute for Disease Modeling.
- Studied the disease progression of HPV in an individual to inform mechanistic model dynamics.
- Collaborated with HPV experts and clinicians.
- Participated in brainstorming and strategic planning meetings to understand the role of projects in the foundation's goals.

**Technical Services Intern** | Mylan Technologies, Saint Albans, VT

June 2019 - Aug. 2019

- Analyzed sampling, a mass balance, and other essential functions of transdermal production at the Mylan Technologies Saint Albans manufacturing plant to highlight inefficiencies.

## Publications and other writings

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**M.C. Boudreau**, J.A. Cohen, & L. Hébert-Dufresne

*Within-host infection dynamics with master equations and the method of moments: A case study of human papillomavirus in the epithelium*

ArXiv (currently under peer review)

R.M. Stuart, J.A. Cohen, C.C. Kerr, P. Mathur, R.G. Abeysuriya, M. Zimmerman, D.W. Rao, **M.C. Boudreau**, S. Lee, L. Yang, & D.J. Klein

*HPVsim: An agent-based model of HPV transmission and cervical disease*

PLOS Comput. Biol. 20(7) e1012181

**M.C. Boudreau**, A.J. Allen, N.J. Roberts, A. Allard, & L. Hébert-Dufresne

*Temporal and probabilistic comparisons of epidemic interventions*

Bull. of Math. Biol. 85(12), 118

A.J. Allen, **M.C. Boudreau**, N.J. Roberts, A. Allard, & L. Hébert-Dufresne

*Predicting the diversity of early epidemic spread on networks*

Phys. Rev. Research 4, 013123

## Interests

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**Volunteer work:** Ski patrol, Mount Otto Rhode Race volunteer