





# MARIAH C. BOUDREAU

## CONTACT

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## EDUCATION

### University of Vermont

2019- estimated 2024

#### Ph.D. in Mathematical Sciences

Advisors: Chris Danforth & Laurent Hébert-Dufresne

### Saint Michael's College

2015-2019

#### B.S. in Mathematics

Minors in Computer Science & Statistics

## SKILLS

Python, R, MATLAB, LaTeX, Java  
Statistical analysis  
Communication, collaboration, problem solving, critical thinking, positive attitude  
Conversational French

## RESEARCH

## INTERESTS

Mathematical modeling for biological applications

## RELEVANT COURSEWORK

Differential Equations (DE), Advanced Ordinary DE, Partial DE, Linear Algebra, Numerical Analysis, Numerical Partial DE, Principles of Complex Systems, Modeling of Complex Systems I & II, Probability and Statistics, Bayesian Statistics

## PROFESSIONAL EXPERIENCE

### Ph.D. Candidate

University of Vermont

August 2019 - Present

- Graduate Research Assistant
- Graduate Teaching Assistant

### Contractor

Institute for Disease Modeling at the Bill and Melinda Gates Foundation

May 2022 - July 2022

## RESEARCH

### Stochastic Modeling

- Incorporated interventions into a time-dependent probability generating function model for an epidemiology application
- Defined metrics for comparing targeted and random vaccination strategies with the result of that model
- Parameterized and aided development of an open-source human papillomavirus (HPV) population model
- Developed a mechanistic model using master equations to give HPV viral load parameter estimates for population model listed above
- Performed a sensitivity analysis for a probability generating function model through simulations for an epidemiology application

### Data Science

- Processing blood work data for the Lived Experience Measured Using Rings study at the University of Vermont
- Planning statistical analysis between blood work data and Oura ring data

## PUBLICATIONS AND OTHER WRITINGS

**M.C. Boudreau**, A.J. Allen, N.J. Roberts, A. Allard & L. Hébert-Dufresne  
*Temporal and probabilistic comparisons of epidemic interventions*  
Bulletin of Mathematical Biology (in press) September 2023

**M.C. Boudreau**, J.A. Cohen & L. Hébert-Dufresne  
Working title: *Epithelium dynamics model with master equations: a case study with Human Papillomavirus*  
Draft available upon request In Progress

**M.C. Boudreau**, C.M. Danforth & L. Hébert-Dufresne  
Working title: *Sensitivity analysis of stochastic polynomials, and its application to epidemic forecasting and random graphs*  
Draft available upon request In Progress

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 February 2022

R.M. Stuart, J.A. Cohen, C.C. Kerr, R.G. Abeyasuriya, M. Zimmerman, D.W. Rao, **M.C. Boudreau**, & D.J. Klein  
*HPVsim: An agent-based model of HPV transmission and cervical disease*  
MedRxiv February 2023