# Bren Case

*Infectious disease modeling • Bayesian statistics • Experimental design*

*Burlington, Vermont*
*919-357-7350*
*bcase@uvm.edu*
*brendandaisy.github.io*
*brendandaisy1*
*brendandaisy*

PhD candidate in Computer Science combining mechanistic modeling and Bayesian statistics for the study of epidemiology and biology. I am especially interested in using these tools for informing how data should be collected, and for assessing control options from a decision-theoretic perspective.

## Education

2018– **Ph.D. Computer Science**, *University of Vermont*, Burlington, Vermont.
- Co-advisors: Laurent Hébert-Dufresne and Jean-Gabriel Young
- Anticipated completion: August 2023

2017–2019 **MRes. Computer Science**, *University of Birmingham*, Birmingham, UK.
- Thesis: Self-adaptation in non-elitist evolutionary algorithms: a rigorous analysis on discrete problems with unknown structure
- Committee: Per Kristian Lehre (advisor), Thomas Jansen, Ata Kaban

2013–2017 **B.A. Mathematics**, *Oberlin College*, Oberlin, Ohio.
- Minor: Computer Science

## Publications

**Microbial dysbiosis precedes signs of sea star wasting disease in wild populations of the Pycnopodia helianthoides**
Andrew R. McCracken, Blair M. Christensen, Daniel Munteanu, **B. K. M. Case**, Melanie Lloyd, Kyle P. Herbert, Melissa H. Pespeni.
*Frontiers in Marine Science.* 2023. HTML PDF

**Spatial epidemiology and adaptive targeted sampling to manage the Chagas disease vector Triatoma dimidiata**
**B. K. M. Case**, Jean-Gabriel Young, Daniel Penados, Carlota Monroy, Laurent Hébert-Dufresne, Lori Stevens.
*PLoS Neglected Tropical Diseases.* 2022. HTML PDF

**Flowers as dirty doorknobs: Deformed wing virus transmitted between Apis mellifera and Bombus impatiens through shared flowers**
Phillip Alexander Burnham, Samantha Alger, **Brendan Case**, Humberto Boncristiani, Laurent Hébert-Dufresne, Alison Brody.
*Journal of Applied Ecology.* 2021. HTML

**Self-adaptation in nonelitist evolutionary algorithms on discrete problems with unknown structure**
**Brendan Case** and Per Kristian Lehre.
*IEEE Transactions on Evolutionary Computation.* 2020. HTML PDF

Submitted or under review

**Accurately summarizing an outbreak using epidemiological models takes time**
**B. K. M. Case**, Jean-Gabriel Young, Laurent Hébert-Dufresne.
*Under review.* Preprint: HTML PDF

**The unintended consequences of inconsistent pandemic control policies**
Benjamin Althouse, Brendan Wallace, **Brendan Case**, Samuel Scarpino, Antoine Allard, Andrew Berdahl, Easton White, Laurent Hébert-Dufresne.
*Under review.* Preprint: HTML PDF

## Presentations

### Conference talks

Feb 2023 **Adapting Survey Designs for Vector Surveillance Using Bayesian Decision Theory: An Application to an Ongoing Tick Monitoring Program in the Southeastern United States**[1], *National Big Data Health Science Conference*, Columbia, South Carolina.

Jun 2019 **Hidden geometry of infestation in Chagas disease vectors: an approach from epidemiological network theory**, *Laboratorio de Entomología Aplicada y Parasitología Research Symposium*, Guatemala City, Guatemala.

May 2019 **Modeling disease spillover using multipartite networks**, *NetSci 2019*, Burlington, VT.

Apr 2019 **Modeling disease spillover in bees: exploring dilution effects**, *UVM Student Research Conference*, Burlington, VT.

### Conference posters

Mar 2022 **Parameter inference in epidemiological modeling: a perspective from Bayesian experimental design**[2], *NERCCS 2022: Fifth Northeast Regional Conference on Complex Systems*, Buffalo, NY.

Sep 2019 **QuEST timeline: highlights from the first year**, *NSF National Research Traineeship annual meeting*, Evanston, IL.

## Teaching

### Teaching Assistant

Spring 2020 **Computability and Complexity**, *University of Vermont*.

Fall 2019 **Modeling Complex Systems**, *University of Vermont*.

Spring 2018 **Software Workshop I**, *University of Birmingham*.

Fall 2017 **Data Structures and Algorithms**, *University of Birmingham*.

Spring 2017 **Foundations of Analysis**, *Oberlin College*.

Spring 2017 **Algorithms**, *Oberlin College*.

Fall 2016 **Discrete Mathematics**, *Oberlin College*.

### Invited Workshops & Lectures

[1] best presentation award
[2] best poster award

9/14 2022 **Introduction to epidemiological models and disease forecasting**, *EPID 394: Infectious Disease Epidemiology*, University of South Carolina.
Slides

8/2 2022 **Spatial epidemiology and adaptive targeted sampling to manage domestic Triatomine infestations in Guatemala**, *UPenn-Tulane-UPCH Zoonotic Disease Research Lab*, University of Pennsylvania.
Slides

6/23 2022 **Introduction to tidy data and network science in R**, *Big Data Health Science Center T35 trainees*, University of South Carolina.
Notes

10/25 2021 **Bayesian Geostatistics and Adaptive Sampling**, *TGIR Adventures in Modeling*, University of Vermont.

8/16–8/23 2021 **QuEST Coding Workshop for Incoming Trainees**, University of Vermont.
Notes

11/15 2019 **The Rest of the Tidyverse**, *BIOL 381: Foundations of Quantitative Reasoning*, University of Vermont.

## Professional Service and Leadership

April 2023 *Reviewer*, Physical Review E.

April 2023 *Reviewer*, Geospatial Statistics.

Jan 2023 *Reviewer*, PLoS Computational Biology.

Oct 2022 *Reviewer*, Frontiers in Ecology and Evolution.

Apr 2022 *Reviewer*, Swarm and Evolutionary Computation.

Apr 2022 *Judge*, Vermont Science Olympiad. Event: Experimental Design.

Feb 2022 *Reviewer*, Physical Review E.

Aug 2021 *Reviewer*, Swarm and Evolutionary Computation.

## Advanced Schools & Workshops

4/10–4/14 2023 **Multi-scale modeling of malaria**, *American Institute of Mathematics*, San Jose, California.

12/15–12/20 2019 **Complex Networks Winter Workshop**, *Université Laval*, Quebec City, Canada.

6/3–6/5 2019 **VectorBase Workshop**, *Universidad del Valle de Guatemala*, Guatemala City, Guatemala.

## Scholarships

2022 **T35 Research Traineeship**, *National Institute for Allergy and Infectious Diseases & University of South Carolina Big Data Health Science Center*, award 5T35AI165252-02.

2018-2023 **QuEST National Research Traineeship**, *National Science Foundation & University of Vermont Graduate College*, award DGE-1735316.

2013-2014 **Conservatory Dean's Scholarship**, *Oberlin College*.

## Selected Software

- Marginal Divergence.jl: a psuedo-Bayesian method for practical identifiability of differential equation models. (Julia)
- Conditional Sampling.jl: sampling from joint distributions conditional on variable transformations (Julia)
- Adaptive targeted sampling using R-INLA (R, RMarkdown)

## Skills & Expertise

| | |
|---|---|
| Programming languages | R (tidyverse, tidygraph, sf/raster, caret), Julia (DifferentialEquations), Python (graph-tool) |
| Statistical programming | Stan, R-INLA, nimble, Turing.jl |
| Visualization | ggplot2, ggraph, Inkscape |

## Community Service

| | |
|---|---|
| 2020-2022 | Food Not Bombs, volunteer cook, *Burlington, VT*. |
| 2019 | ANEW Place, meal provider, *Burlington, VT*. |
| 2017-2018 | GoodGym, general member, *Birmingham, UK*. |
| 2014-2015 | Boys and Girls Club, tutor, *Oberlin, OH*. |