

Bren Case

Infectious disease modeling • Bayesian statistics • Experimental design

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Epidemiology and Biostatistics
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Education

- 2018–2023 **Ph.D. Computer Science**, *University of Vermont*, Burlington, Vermont.
◦ Thesis: [Bayesian experimental design for control and surveillance in epidemiology](#)
◦ Advisors: Laurent Hébert-Dufresne and Jean-Gabriel Young
- 2017–2019 **MRes. Natural Computation**, *University of Birmingham*, Birmingham, UK.
◦ Thesis: Self-adaptation in non-elitist evolutionary algorithms: a rigorous analysis on discrete problems with unknown structure
◦ Advisor: Per Kristian Lehre
- 2013–2017 **B.A. Mathematics**, *Oberlin College*, Oberlin, Ohio.
◦ Minor: Computer Science

Experience

- 2023–present **Postdoctoral Associate**, *University of Georgia*.
- 2018–2023 **Graduate Research Assistant**, *University of Vermont*.
- 2019–2020 **Graduate Teaching Assistant**, *University of Vermont*.
- 2017–2018 **Graduate Teaching Assistant**, *University of Birmingham*.
- 2016–2017 **Teaching Assistant**, *Oberlin College*.

Publications

The unintended consequences of inconsistent pandemic control policies

Benjamin Althouse, Brendan Wallace, **B. K. M. Case**, Samuel Scarpino, Antoine Allard, Andrew Berdahl, Easton White, Laurent Hébert-Dufresne.

BMC Global and Public Health. In press. Preprint: [HTML PDF](#)

Accurately summarizing an outbreak using epidemiological models takes time

B. K. M. Case, Jean-Gabriel Young, Laurent Hébert-Dufresne.

Royal Society Open Science. 2023. [HTML PDF](#)

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](#)

Adapting vector surveillance using Bayesian Experimental Design: an application to an ongoing tick monitoring program in the southeastern United States

B. K. M. Case, Kyndall C. Dye-Braumuller, Chris Evans, Huixuan Li, Lauren Rustin, Melissa S. Nolan.

Under review.

Presentations

[Conference talks](#)

- Jul 2023 **Restricted Marginal Divergence: an efficient Bayesian measure of practical identifiability for nonlinear systems in biology and epidemiology**, *Society for Mathematical Biology Annual Meeting*, Columbus, Ohio.
- Feb 2023 **Adapting Survey Designs for Vector Surveillance Using Bayesian Decision Theory: An Application to an Ongoing Tick Monitoring Program in the Southeastern United States¹**, *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.

[Posters](#)

- Oct 2023 **Adapting vector surveillance surveys using Bayesian Experimental Design: an application to an ongoing tick monitoring program in the southeastern United States**, *ASTMH 2023 Annual Meeting*, Chicago, IL.
- Mar 2022 **Parameter inference in epidemiological modeling: a perspective from Bayesian experimental design²**, *NERCCS 2022: Fifth Northeast Regional Conference on Complex Systems*, Buffalo, NY.

¹best presentation award

²best poster award

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

Invited lectures

- 9/21 2023 **Bayesian experimental design for control and surveillance in epidemiology**, *Infectious Disease Interest Group (IDIG)*, University of Georgia.
- 9/8 2023 **Bayesian experimental design for control and surveillance in epidemiology**, *Chaves Lab*, Indiana University.
- 9/14 2022 **Introduction to epidemiological models and disease forecasting**, *EPID 394: Infectious Disease Epidemiology*, University of South Carolina.
- 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.
- 6/23 2022 **Introduction to tidy data and network science in R**, *Big Data Health Science Center T35 trainees*, University of South Carolina.
- 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.
- 11/15 2019 **The Rest of the Tidyverse**, *BIOL 381: Foundations of Quantitative Reasoning*, University of Vermont.

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*.

Professional Service and Leadership

- Apr 2022 **Vermont Science Olympiad**, *Judge*, Burlington, VT.
Organized all materials and evaluated Experimental Design event
- 2014-2015 **Boys and Girls Club**, *Tutor*, Oberlin, OH.
After-school program providing local kids with food and tutoring in reading and math

Reviewer

PLoS Computational Biology; Geospatial Statistics; Physical Review E; Ticks and Tick-borne Diseases; Frontiers in Ecology and Evolution; Swarm and Evolutionary Computation.

Organizer

Jul 2023 **Recent advances in parameter identifiability of mathematical models in mathematical biology**, *Co-organizer, Symposium at the Society of Mathematical Biology Annual Meeting*, Columbus, Ohio.

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, SciML), Python (graph-tool)
- Statistical programming: Stan, R-INLA, nimble, Turing.jl
- Visualization: ggplot2, ggraph, Inkscape