

# Casey E. Middleton

[casey.middleton@colorado.edu](mailto:casey.middleton@colorado.edu) • [LinkedIn](#) • [Personal Website](#)

## EDUCATION

**University of Colorado**, Boulder, CO USA

PhD, Computer Science (May 2025)

Advised by Dr. Daniel Larremore

*Multiscale Infectious Disease Dynamics: Linking Epidemiology and Testing for Outbreak Neutralization*

**Rhodes College**, Memphis, TN USA

B.S. [Biomathematics](#) — *cum laude*

## RESEARCH PUBLICATIONS

Bubar, K., **Middleton, C.**, Larremore, D., and Gostic, K. A fundamental limit to the effectiveness of traveller screening with molecular tests. *Epidemiology & Infection* **153**, e95 (2025). doi:[10.1017/S0950268825100381](https://doi.org/10.1017/S0950268825100381).

**Middleton, C.** and Larremore, D. Statistical Methods for Estimating the Protective Effects of Immune Markers Using Test-Negative Designs. *medRxiv* (2024). doi:[10.1101/2025.04.05.25325304](https://doi.org/10.1101/2025.04.05.25325304).

**Middleton, C.** and Larremore, D. Modeling the transmission mitigation impact of testing for infectious diseases. *Science Advances* **10**, 5108 (2024). doi:[10.1126/sciadv.adk5108](https://doi.org/10.1126/sciadv.adk5108).

Featured in [CU Today](#), [HealthDay News](#), [US News & World Report](#), etc.

Wu, S., Bjerke, J., **Middleton, C.**, et al. Viral genomes and host biomarkers in saliva can detect dengue virus infection in experimentally infected human subjects. [In prep]

Bubar, K.\*, **Middleton, C.\***, Bjorkman, K., Parker, R., Larremore, D. SARS-CoV-2 Transmission and Impacts of Unvaccinated-Only Screening in Populations of Mixed Vaccination Status. *Nature Communications* **13**, 2777 (2022). doi:[10.1038/s41467-022-30144-7](https://doi.org/10.1038/s41467-022-30144-7). Featured in [CU Boulder Today](#).

Scott, S., **Middleton, C.**, and Bodine, E.N. An agent-based model of the spatial distribution and density of the Santa Cruz Island Fox: the effects of Golden Eagle predation and Island Fox recovery. *Integrated Population Biology & Modeling*, Vol. 40 of *Handbook of Statistics*, Elsevier, 2019. doi:[10.1016/bs.host.2018.10.001](https://doi.org/10.1016/bs.host.2018.10.001)

**Middleton, C.**, Deery, E., and Bodine, E. The Potential Impact of Using Vaccination and Insect Repellent to Control the Spread of Yellow Fever. *SPORA: A Journal of Biomathematics* **4(1)**: 15 – 24. doi:[10.30707/SPORA4.1Middleton](https://doi.org/10.30707/SPORA4.1Middleton). Recipient of Outstanding Undergraduate Research award.

\* Authors contributed equally

## AWARDS

2025 **Departmental Outstanding Research Paper Award**

Department of Computer Science, University of Colorado Boulder, Boulder, CO

2025 **3 Minute Thesis Runner Up**

University of Colorado Boulder, Boulder, CO

2024 **Halloran Scholarship and SISIMID Travel Award**

Summer Institute in Statistics and Modeling in Infectious Diseases (SISIMID), Atlanta, GA

2023 **Outstanding Service to Biofrontiers Institute**

Biofrontiers Institute, University of Colorado Boulder, Boulder, CO

2022 **Departmental Outstanding Research Award**

Department of Computer Science, University of Colorado Boulder, Boulder, CO

- 2020 **Olke C. Uhlenbeck Graduate Fellowship**  
BioFrontiers Institute, University of Colorado Boulder, Boulder, CO
- 2018 **Outstanding Senior in Mathematics**  
Rhodes College, Memphis, TN
- 2017 **Outstanding Undergraduate Research in Biomathematics and Ecology Scholarship**  
Intercollegiate Biomathematics Alliance
- Robert Allen Scott Award in Mathematics**  
Rhodes College, Memphis, TN

PROFESSIONAL  
EXPERIENCE

- 2024 **Summer ORISE Fellow**  
[Center for Forecasting and Outbreak Analytics](#) (CFA) at CDC  
Developing performance analysis pipeline for SARS-CoV-2 variant nowcasting methods
- 2020 – 2025 **Graduate Research Assistant**  
Department of Computer Science, University of Colorado Boulder  
Advised by Prof. Daniel Larremore
- 2019 – 2020 **Contract Data Analyst**  
Data analysis, visualization, & policy recommendations for City of Memphis
- Lead Teacher**  
[KIPP Memphis Collegiate High School](#)  
Tenth grade geometry teacher
- 2018 – 2019 **Americorps: Volunteer in Service to America**  
Neighborhood Preservation, Inc.  
Data analytics for housing policy recommendations
- 2016 – 2018 **Teaching Assistant**  
Department of Mathematics and Computer Science, Rhodes College  
Classes: *Mathematical Modeling with Biological Applications*, *Applied Calculus*
- Senior Administrator for Applied Mathematics Tutoring**  
Department of Mathematics and Computer Science, Rhodes College
- 2016 **Biomathematics Research Fellow**  
Department of Mathematics and Computer Science, Rhodes College  
Generating social structure algorithms for yellow-bellied marmot populations
- 2015 – 2016 **Calculus Tutor**  
Department of Mathematics and Computer Science, Rhodes College

RESEARCH  
PRESENTATIONS  
† : ORAL PRESENTATION

- “Testing, Testing, 1, 2, 3.” †  
3 Minute Thesis, Boulder, Colorado, February 2025.
- “Fundamental Limit to the Effectiveness of Traveler Screening.”  
EPIDEMICS 2023, Bologna, Italy, November 2023.  
MIDAS 2023, Atlanta, GA, September 2023. †
- “How Should We Test for Infectious Diseases?” †  
Computer Science Departmental Colloquium, University of Colorado Boulder, February 2023.
- “A Generalized Modeling Framework for the Mitigation Potential of Testing.” †  
MIDAS 2022, Bethesda, Maryland, September 2022.
- “Modeling the Impact of Unvaccinated-Only Screening in Populations with Mixed Vaccination Status.”  
Ecology and Evolution of Infectious Diseases (EEID) 2022, Atlanta, Georgia, June 2022.
- “A Probabilistic Model of Disease Mitigation via Testing.” †  
Math Bio SuperGroup, Boulder, Colorado, November 2021 (virtual).
- “Forecasting Spring Green-Up in Deciduous Forests.” †  
Quantitative Exploration SuperGroup, Boulder, Colorado, May 2021 (virtual).
- “Predicting the Impact of Community Testing on SARS-CoV-2 Transmission.” †

- Biofrontiers Institute, Boulder, Colorado, March 2021 (virtual).
- “Predicting the Impact of Community Testing on SARS-CoV-2 Transmission.” †  
Biofrontiers Institute, Boulder, Colorado, December 2020 (virtual).
- “Modeling Soil Moisture Impacts on Perennial and Annual Crop Production.” †  
Biofrontiers Institute, Boulder, Colorado, October 2020 (virtual).
- “Reducing False Alarm Occurrence in the City of Memphis.” †  
Mayor’s Dashboard, Memphis, TN, May 2019 (virtual).
- “An Accountability System for Rental Property Management Companies.” †  
Department of Public Works at City Hall, Memphis, TN, April 2019.
- “Urban Mathematics: Using Applied Mathematics in Neighborhood Revitalization.” †  
Blight Elimination Steering Team Meeting, Memphis, TN, March 2019.
- “Using Agent-Based Modeling to Understand Transmission Dynamics of Yellow Fever in 1878.” †  
2018 Mathematics Seminar at Rhodes College, Memphis, TN, April 2018.
- “The Potential Impact of Using Vaccination and Insect Repellent to Control the Spread of Yellow Fever.”  
Intl. Symposium on Biomathematics and Ecology Education and Research, Normal, IL, October 2017.

## SERVICE

Service to University of Colorado, Boulder

- **Graduation Speaker** (2025): Selected to address 4000 attendees at the computer science graduation ceremony
- **Quantitative Exploration and Discussion** (2021 - 2024): Organizing monthly workshops for the Biofrontiers Institute with a focus on computational skills and quantitative biology
- **Women in Mathematics** (2022): Calculus tutor

Service to Alpha Omicron Pi

- **Philanthropy Chairman** (2016 - 2018): Increased donations to the National Arthritis Foundation five-fold from the previous year through event organizing and volunteer hours

Service to Rhodes College Department of Mathematics and Computer Science

- **Computational writing editor** (2017 - 2018): Grader and editor for continuous mathematical modeling, a writing intensive APPM course
- **Applied calculus training** (2016 - 2018): Organized tutorial sessions, training tutors to provide guidance on group projects or homework problems
- **Calculus sequence redesign** (2018): Served on a committee to redesign the calculus sequence, planning coursework to be performed in a guided lab outside of class meeting times
- **Applied mathematics tutorials** (2017 - 2018): Worked with multiple professors to design a weekly tutorial meeting for students enrolled in mathematical modeling with biological applications

## SKILLS

### Programming & Computation

- *Basic Programming Languages*: Python, R, C++, SQL
- *Modeling & Computation Software*: MATLAB, NetLogo, Mathematica, L<sup>A</sup>T<sub>E</sub>X
- *Geographic Information Systems*: ArcGIS, QGIS

### Constructing & Analyzing Mathematical Models

- Ordinary differential equation models
- Agent/individual-based models
- Discrete difference equation models
- Statistical models using probabilistic inference
- Network models
- Parameter estimation methods (frequentist and Bayesian)

### Scientific Communication

- Presenting high-level methods and real-world implications of science to policymakers
- Storytelling with data visualization
- Scoping presentations to be appropriate for intended audience
- Tutoring and TAing for mathematics & computation courses