

Cole Butler

Biomathematics Ph.D. Candidate

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Personal Statement

Very driven and accomplished student who thoroughly enjoys attacking any problem with rigor and analytical clarity. Skilled in leadership and experienced with working with other people. Enjoys working on tough problems with many people, both peers and professors alike. Knowledgeable in utilizing various programming languages, including but not limited to R and MATLAB. Maintains creative way of thinking and enjoys cultivating new friendships. Passionate about natural models, especially concerning epidemiological systems.

Education

2020- **North Carolina State University**

2016-2020 **University of Maine at Orono**

B.S. in Mathematics, summa cum laude; Honors College (highest honors); Dean's list; 3.95 GPA

Relevant coursework

Calculus I, II, III	Higher Geometry
Differential Equations	Statistical Machine Learning
Linear Algebra	(Graduate) Nonlinear Systems and Bifurcations
Vector Calculus	(Graduate) Topology I, II
Dynamical Systems	(Graduate) Advanced Linear Algebra
Complex Analysis	(Graduate) Agent-based Modeling
Real Analysis I, II	(Graduate) Abstract Algebra
Biological Modeling and Simulation	(Graduate) Biomathematics I

Fellowships

- Center for Undergraduate and Graduate Research Fellowship 2016 and 2019, \$1,000 each
- College of Liberal Arts and Sciences Fellowship 2018, \$4,000
- NC State University Provost's Doctoral Fellowship 2020-21, \$28,000
- NC State University Graduate Fellowship 2020-21, \$4,000

Honors and Awards

- University of Maine Presidential Award
- Edward Morrison Pacesetter Scholarship
- Michael and Jana Cote Scholarship
- Ray M. Boynton Scholarship
- Civil Engineering Department Award
- Theodore and Dorothy Whitehouse Scholarship
- Carl Whitcomb Meinecke Award
- James S. Stevens Award
- College of Liberal Arts and Sciences Outstanding Junior Award
- Margaret Chase Smith Public Affairs Scholarship

- Dominic J. Roux Scholarship

Papers (submitted)

Butler, C., Cheng, J., Correa, L., Preciado, M., Ríos, A., Montalvo, C., and C. Kribs. *Comparison of screening for methicillin-resistant Staphylococcus aureus (MRSA) at hospital admission and discharge*. Manuscript submitted for publication; Arxiv: *q-bio.PE/1911.07711*, 2019.

Research experience

Mathematics and Statistics Department, University of Maine Orono, ME, 2017-August 2020

- Working at Computational Modeling, Analysis of Imagery and Numerical Experiments (CompuMAINE) lab
- Writing algorithm to scan mammograms using Metric Space Technique (MST)
- The software can potentially make identifying breast cancer in women easier
- The software will have applications beyond biology, including but not limited to astrophysics and engineering
- Modeling growth of cancer microcalcifications in artificial environment

Mathematics and Statistics Department, University of Maine Orono, ME, 2017-2018

- Research assistant for Professor David Hiebeler
- Developed a computational model simulating biological and ecological systems in nature on a discrete-state lattice

Mathematical and Theoretical Biology Institute, Arizona State University Tempe, AZ, Summer 2018

- Research Experience for Undergraduates (REU) program
- Led a team comprised of Ecuadorian, Colombian, and Chinese students with the help of Professor Christopher Kribs
- Attended lectures on mathematical biology and dynamical systems
- Studied MRSA disease dynamics and developed disease model

School of Biology and Ecology, University of Maine Orono, ME, May 2019-June 2020

- Studying how metapopulation network characteristics effect transmission of disease
- Developed species distribution model of *Aedes aegypti* mosquito
- Objective is to combine species distribution of mosquitoes and network characteristics of regions in South America to create disease model for Zika and Chikungunya

Margaret Chase Smith Policy Center, University of Maine Orono, ME, Fall 2019-July 2020

- Developing an opioid model for the state of Maine
- The goal of the project is to better inform public policy decisions surrounding the opioid epidemic in Maine, as well as serve as a template for future mathematical models of opioid use proliferation

Dynamics and Data in the COVID-19 Pandemic San Jose, CA, June 2020-July 2020

- Workshop hosted by the American Institute of Mathematics to study COVID-19 and develop mathematical models to understand disease dynamics
- Applied optimal control theory to different mathematical models to determine the optimal control in a variety of situations

Conference Presentations

“Population models on continuous-valued heterogeneous landscapes,” 2018 University of Maine Student Symposium, University of Maine, Orono, ME.

“Comparison of screening for methicillin-resistant *Staphylococcus aureus* (MRSA) at hospital admission and discharge,” presented at the following venues:

- 2018 Mathematical and Theoretical Biology (MTBI) Conference, Arizona State University, Tempe, AZ.
- 2018 Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) Conference, San Antonio, TX.
- 2018 National Institute for Mathematical and Biological Synthesis (NIMBioS) Conference, Knoxville, TN.

“A predator-prey model with parasitic infection of the predator,” 2020 Virtual Symposium on Biomathematics and Ecology Education and Research (BEER), held virtually.

“A mathematical model of the opioid epidemic in Maine,” 2020 Triangle Area Graduate Mathematics Conference (TAGMaC), held virtually.

Service & Outreach

- Journal reviewer for *Letters in Biomathematics* since 2020
- Volunteer for NCSU chapter of Undergraduates Union Graduates (UUG)
- Volunteer tutor for local high schools
- Online tutor since April 2020 for subjects including calculus, differential equations, linear algebra, basic math, programming, and writing
- Organizer of the Biomathematics Journal Club at NCSU

Professional Memberships

Society of Mathematical Biology

Society of Industrial and Applied Mathematics