

## Erin N. Bodine

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Contact  
Information

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*O ce:* 901-843-3254

- Bodine, E.N., Cook, C., and Shorten, M. The potential impact of a prophylactic vaccine for Ebolavirus in West Africa. *Mathematical Biosciences & Engineering*, 2018; 15(2): 337{359.  
[PDF] doi:[10.3934/mbe.2018015](https://doi.org/10.3934/mbe.2018015)
- Bodine, E.N. and Capaldi, A. Can harvesting of barred owls save the declining spotted owl population? *Natural Resource Modeling*, 2017; 30(3): e12131.  
[PDF] doi:[10.1111/nrm.12131](https://doi.org/10.1111/nrm.12131)
- Bodine, E.N. and Monia, K.L. A model of proton therapy using discrete diffusion with an example of treating Hepatocellular carcinoma. *Mathematical Biosciences & Engineering*, 2017; 14(4): 881{899.  
[PDF] doi:[10.3934/mbe.2017047](https://doi.org/10.3934/mbe.2017047)
- Bodine, E.N. and Yust, A. Predator-prey dynamics with intraspecific competition and an Allee effect in the predator population. *Letters in Biomathematics*, 2017; 4(1): 23{38.  
[PDF] doi:[10.1080/23737867.2017.1282843](https://doi.org/10.1080/23737867.2017.1282843)
- Bodine, E.N. and Martinez, M.V. Optimal Genetic Augmentation Strategies for a Threatened Population using a Continent-Island Model. *Letters in Biomathematics*, 2014; 1: 23{39.  
[PDF] doi:[10.1080/23737867.2014.11414468](https://doi.org/10.1080/23737867.2014.11414468)
- Scott, S.M., Yust, A. and Bodine, E.N. An Agent-Based Model of Santa Cruz Island Foxes (*Urocyon littoralis santacruzae*) which Exhibits an Allee Effect. *Letters in Biomathematics*, 2014; 1: 97{109.  
[PDF] doi:[10.1080/23737867.2014.11414473](https://doi.org/10.1080/23737867.2014.11414473)
- Lenhart, S., Bodine, E.N., Zhong, P., and Joshi, H. Illustrating optimal control applications with discrete and continuous features. In *Advances in Applied Mathematics, Modeling, and Computational Science*, Vol. 66 of *Fields Institute Communications Series*. Springer, 2013; pp.209{238.  
[PDF] doi:[10.1007/978-1-4614-5389-5\\_9](https://doi.org/10.1007/978-1-4614-5389-5_9)
- Bodine, E.N., Gross, L., Lenhart, S. Order of Events Matter: Comparing Discrete Difference Equation Models for the Optimal Control of Species Augmentation. *Journal of Biological Dynamics* 2012; 6(2): 31{49.  
[PDF] doi:[10.1080/17513758.2012.697197](https://doi.org/10.1080/17513758.2012.697197)
- Smith?, R.J., Okano, J.R., Kahn, J.S., Bodine, E.N., Blower, S. Evolutionary dynamics of complex networks of HIV drug-resistant strains: The Case of San Francisco. *Science* 2010; 327(5966): 679{701.  
[PDF] doi:[10.1126/science.1180556](https://doi.org/10.1126/science.1180556)
- Bodine, E.N., Gross, L., Lenhart, S. Optimal control applied to a model for species augmentation. *Mathematical Biosciences & Engineering* 2008; 5(4): 669{680.  
[PDF] doi:[10.3934/mbe.2008.5.669](https://doi.org/10.3934/mbe.2008.5.669)
- Schwartz, E.J., Bodine, E.N., and Blower, S. Effectiveness and efficiency of imperfect therapeutic HSV-2 vaccines. *Human Vaccines* 2007; 3(6): 231{238.  
[PDF] doi:[10.4161/hv.4529](https://doi.org/10.4161/hv.4529)
- Kajita, E., Bancroft, E., Bodine, E.N., Okano, J., Layne, S.P., and Blower, S.M. Modeling an outbreak of an emerging pathogen. *Nature Reviews Microbiology* 2007; 5: 700{709.  
[PDF] doi:[10.1038/nrmicro1660](https://doi.org/10.1038/nrmicro1660)
- Blower, S.M., Bodine, E.N., and Grovit-Ferbas, K. Predicting the potential public health impact of disease-modifying HIV vaccines in South Africa: the problem of clades. *Current Drug Targets - Infectious Disorders* 2005; 5(2): 179{192.  
[PDF] doi:[10.2174/1568005054201616](https://doi.org/10.2174/1568005054201616)
- Smith?, R.J., Bodine, E.N., Wilson, D.P., and Blower, S.M. Evaluating the potential impact of vaginal microbicides to reduce the risk of acquiring HIV in female sex workers. *AIDS* 2005; 19(4): 423{431.  
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- Blower, S., Bodine, E.N., Kahn, J., and McFarland, W. The antiretroviral rollout & drug resistant HIV in Africa: Insights from empirical data & theoretical models. *AIDS* 2005; 19(1): 1{14.  
[PDF]

- Textbooks Bodine, E.N., Lenhart, S., and Gross, L.J. *Mathematics for the Life Sciences*. Princeton University Press, 2014.
- Published Teaching Materials Bodine, E.N. Agent-Based Modeling Course Materials. *QUBES Educational Resources*. 2019.  
doi:[10.25334/Q4VF0K](https://doi.org/10.25334/Q4VF0K)
- Bodine, E.N. Discrete Math Modeling with Biological Applications (Course Materials). (Version 2.0). *QUBES Educational Resources*. 2019.  
doi:[10.25334/Q4C137](https://doi.org/10.25334/Q4C137)
- Bodine, E.N. Discrete Math Modeling with Biological Applications (Course Materials). (Version 1.0). *QUBES Educational Resources*. 2018.  
doi:[10.25334/Q42T54](https://doi.org/10.25334/Q42T54)

2012: *Hill Grant for Curricular Development*, Rhodes College, Memphis, TN.  
Funding for the development of an upper level mathematical modeling course using an inquiry based approach.

Submitted  
Grants

2018: *SG: Collaborative Research: RUI: Modeling Life History Evolution of Bromeliaceae*  
National Science Foundation  
Submitted: November 2018 Expected Decision Date: Early Summer 2019

Awards

2019{2022: *E.C. Ellett Professorship in Mathematics & Computer Science*  
Rhodes College, Memphis, TN

2014: *Early Leave (Junior Sabbatical)*  
Rhodes College, Memphis, TN

2010{2011: *Project Next Fellow*  
Mathematics Association of America

2009{2010: *Graduate Research Fellowship*  
National Institute for Mathematical & Biological Synthesis, Knoxville, TN

2008: *Landahl Travel Award for 2008 Society of Mathematical Biology Conference*  
Society of Mathematical Biology

2008: *Graduate Student Travel Award for 2008 Society of Mathematical Biology Conference*  
University of Tennessee Graduate Student Senate

2008: *Finalist for Dorothea & Edgar Graduate Student Teaching Award*  
Department of Mathematics, University of Tennessee, Knoxville

2007: *Travel Grant for 27<sup>th</sup>*



## Posters

= student coauthor(s)

- 2017 October 6: *Modeling the Evolution & Dispersal of a Rumor in a Close-Knit Community*. 2017 Symposium on Biomathematics & Ecology: Education and Research at Illinois State University, Normal, IL. Coauthor: Brandon Bates.
- 2017 October 6: *Modeling the Effects of a Wolbachia IIT Control Measure on a Yellow Fever Epidemic*. 2017 Symposium on Biomathematics & Ecology: Education and Research at Illinois State University, Normal, IL. Coauthors: Elizabeth Olsen and Margaret Myers.
- 2017 October 6: *The Potential Impact of using Vaccination & Inset Repellent to Control the Spread of Yellow Fever*. 2017 Symposium on Biomathematics & Ecology: Education and Research at Illinois State University, Normal, IL. Coauthors: Erin Deery and Casey Middleton.
- 2017 October 6: *Modeling the Effects of Water Treatment & Removal in Controlling Yellow Fever*. 2017 Symposium on Biomathematics & Ecology: Education and Research at Illinois State University, Normal, IL. Coauthors: Jordan Ankersen and Cailey Kesselring.
- 2015 July 1: *The Potential Impact of a Prophylactic Vaccine for Ebola in West Africa*. 2015 International Society for Mathematical Biology Conference in Atlanta, GA. Coauthors: Connor Cook and Kayla Shorten.
- 2015 July 1: *An Agent-Based Model of Golden Eagle Predation on the Santa Cruz Island Fox*. 2015 International Society for Mathematical Biology Conference in Atlanta, GA. Coauthor: Shelby Scott.
- 2009 October 10: *Optimal Control of Species Augmentation Using a Continuous Time Model*. Second International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems, Huntsville, AL.
- 2009 April 24: *Discrete Time Optimal Control of Species Augmentation: Augment then Grow*. Workshop for Young Researchers in Mathematical Biology at the Mathematical Biology Institute, Columbus, OH.
- 2009 July 7: *Optimal Control of Species Augmentation Using a Continuous Time Model*. Association of Women in Mathematics Workshop at the 2009 Society of Industrial & Applied Mathematics Meeting, Denver, CO.

## Pedagogy Presentations

= Invited

- 2017 October 8: *Approachable Modeling without Calculus*. 2017 Symposium on Biomathematics & Ecology: Education and Research at Illinois State University, Normal, IL.
- 2017 July 24: *Lets do it discretely! An introduction to discrete difference equations models in the life sciences*. Invited talk for BioQuest 2017 Summer Workshop *Making Meaning through Modeling: Problem solving in Biology* in East Lansing, MI. Co-presenter: Carrie Diaz Eaton.
- 2016 October 16: *Adventures in Teaching Agent-Based Modeling*. 2016 Symposium on Biomathematics & Ecology: Education and Research at College of Charleston, SC.
- 2016 June 20: *Agent-based models: an approachable context for introducing students to scientific modeling, programming, and simulation*. Invited talk for BioQuest 2016 Summer Workshop *Lowering the Activation Energy: Making Quantitative Biology More Accessible* in Raleigh, NC. Co-presenter: Jeremy Wojdak.
- 2015 July 2: *An Introductory Biomath Course without Calculus: Doing it all Discretely { Modeling, Computation, Linear Algebra, & ABMs*. Invited talk for Mini-Symposium on Preparing Students in Quantitative Biology: Entry-Level Courses at the 2015 International Society for Mathematical Biology Conference in Atlanta, GA.
- 2015 June 30: *Mathematical Modeling & Scientific Writing: An Upper Level Biomathematics Course*. Invited talk for Mini-Symposium on Topics in Biomathematics Education at the 2015 International Society for Mathematical Biology Conference in Atlanta, GA.
- 2014 March 15: *New Intro Math Modeling Course: A Discrete Math Modeling Course with an Emphasis on Biological Applications and No Calculus Prerequisites*. 2014 Mathematical Association of America { Southeastern Section Meeting at Tennessee Tech, Cookeville, TN.

- 2013 October 13: *New Paradigms for Collaborative Undergraduate Research in Biomathematics*. 2013 Biomathematics & Ecology Education and Research Symposium at Marymount University in Arlington, VA.
- 2013 June 11: *Learning to Communicate Research: Using Writing & Student Presentations in Undergraduate Modeling Courses*. Invited talk for Mini-Symposium on Preparing Students for Undergraduate Research Experiences at the 2013 International Society for Mathematical Biology Conference in Phoenix, AZ.
- 2013 March 16: *Assessing Scientific Writing in a Mathematical Modeling Course*. Education Session at 2013 Mathematical Association of America { Southeastern Section Meeting at Winthrop University, Rock Hill, SC.
- 2012 November 11: *Model Writing: A Mathematical Modeling Course with a Focus on Scientific Writing*. Education Session at 2012 International Symposium on Biomathematics & Ecology Education and Research in St. Louis, MO.
- 2012 July 25: *First-year Biomathematics: Considerations, possible frameworks, and resources*. Invited talk for Mini-Symposium on First-year Course Reform for Biology Majors at the 2012 International Society for Mathematical Biology Conference at the University of Tennessee, Knoxville, TN.
- 2012 March 9: *Homework Utopia: Getting Calculus Students to do More Homework & Like It*. Project NExT-SE Workshop at the 2012 Mathematics Association of America - Southeastern Section Meeting at Clayton State University, Morrow, GA.
- 2009 November 10: *Graduate Student Forum L<sup>A</sup>T<sub>E</sub>X Series: Beamer Presentations*. Graduate Student Forum Series, Department of Mathematics, University of Tennessee, Knoxville.
- 2009 October 13: *Graduate Student Forum L<sup>A</sup>T<sub>E</sub>X Series: Graphics & Bibliographies*. Graduate Student Forum Series, Department of Mathematics, University of Tennessee, Knoxville.

Teaching  
Experience

- 2017 - Present, *Associate Professor*, Rhodes College
- Math 115 { Applied Calculus (Fall 2018)
  - Math 214 { Discrete Mathematical Modeling with Biological Applications (Fall 2017, Spring 2018, Fall 2018)
  - Math 223 { Multivariable Calculus (Spring 2018)
  - Math 314 { Agent-Based Modeling (Spring 2018)
  - Math 315 { Mathematical Modeling & Scientific Writing (Fall 2017, Fall 2018)
- Research Credits { *Courses taken by students engaged in research projects with me*
- Math 451/452 { Mathematics Research (Fall 2017, Spring 2018, Fall 2018)
    - { Fall 2017: 4 students, 5 total credit hours
    - { Spring 2018: 7 students, 11 total credit hours
    - { Fall 2018: 6 students, 11 total credit hours
  - ENVS 451/452 { Environmental Science Research (Spring 2018, Fall 2018)
    - { Spring 2018: 1 student, 1 total credit hour
    - { Fall 2018: 1 student, 1 total credit hour
- 2010 { 2017, *Assistant Professor*, Rhodes College
- Math 114 { Math for Life Sciences (Spring 2012)
  - Math 115 { Applied Calculus (Spring 2015, Spring 2017)
  - Math 214 { Discrete Mathematical Modeling with Biological Applications (Fall 2013, Fall 2014, Fall 2015, Fall 2016)
  - Math 121 { Calculus I (Fall 2010, Spring 2011, Fall 2011, Spring 2012, Fall 2012)
  - Math 122 { Calculus II (Spring 2011)
  - Math 223 { Calculus III: Multivariable Calculus (Fall 2011, Spring 2012, Spring 2013, Fall 2013, Fall 2015, Spring 2017)

Math 314 { Agent-Based Modeling (Spring 2017)  
Math 315 { Mathematical Modeling (Fall 2012, Fall 2013, Fall 2014, Fall 2016)  
Math 386 { Junior Seminar in Mathematics (Spring 2015)  
Math 465 { Topics in Advanced Mathematical Modeling (Spring 2013)  
Math 465 { Evolutionary Game Theory (Spring 2015)  
Math 485 { Senior Seminar in Mathematics (Fall 2014)  
Math 486 { Senior Seminar in Mathematics (Spring 2015)

Research Credits { *Courses taken by students engaged in research projects with me*

Math 451/452 { Mathematics Research (Fall 2015, Spring 2017, Summer 2017, Spring 2018, Fall 2018)  
{ Fall 2015: 1 student, 4 total credit hours  
{ Spring 2017: 6 students, 13 total credit hours  
{ Summer 2017: 3 students, 3 total credit hours

2007 { 2009, *Graduate Teaching Associate (Instructor of Record)*, University of Tennessee, Knoxville



2012 March 8 { 9: *Project NExT{SE Workshop* at the 2012 Mathematics Association of America{ Southeastern Section (MAA{SE) Annual Conference at Clayton State University in Morrow, GA. A series of talks about teaching pedagogy and innovative teaching techniques for Project NExT (New Experiences in Teaching) Fellows in MAA{SE.

2010 { 2011: *Project NExT (New Experiences in Teaching) Fellow*. A professional development program for new and recent PhDs in the mathematical sciences. Participated in three workshops during fellowship:

- 2011 August 3 { 5: *Project NExT Workshop at MathFest 2011* in Lexington, KY.
- 2011 Jan 5 { 7: *Project NExT Workshop at the 2011 Joint Math Meetings* in New Orleans, LA.
- 2010 August 2 { 4: *Project NExT Workshop at MathFest 2010*, Pittsburgh, PA.

2010 April 16 { 17: *E ffective College Teaching Workshop Program* by Drs. Richard M. Felder and Rebecca Brent. Program for Excellence & Equity in Research (PEER), University of Tennessee, Knoxville.

2009, Spring Semester: *Best Practices in Teaching Program*, University of Tennessee, Knoxville.

## Service

Service as a Referee

- *Conservation Letters*
- Chapter of book *Braaaiinnnsss! From Academics to Zombies* edited by Robert Smith
- Chapter of book *Foundations for Undergraduate Research in Mathematics (FURM): An Introduction to Undergraduate Research in Computational and Mathematical Biology: From Disease Dynamics to Big Data* edited by Hannah Highlander, Alex Capaldi, and Carrie Diaz Eaton
- *Ecological Modeling*
- *Journal of Theoretical Biology*
- *Letters in Biomathematics*
- *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies*
- *Proceedings on the Symposium of Biomathematics & Ecology Education and Research*
- *Involve: A Journal of Mathematics*
- *SPORA: A Journal of Biomathematics*

Service to the Broader Mathematics and Biomathematics Communities

- Secretary of the Mathematics Association of America's Special Interest Group in Biomathematics (BioSIGMAA), 2014 { 2017.

Service to Rhodes College and the Department of Mathematics & Computer Science

- Advising:  
{ Advisor for Math & Biomath majors (listed by graduation year): ce

- Member of the Advising Committee, 2012 { 2013, and 2014 { 2017.
- Departmental faculty in charge of Mathematics & Computer Science Department web content, 2012 { 2013.
- Member of the ad-hoc committee developing the Biomathematics Major, 2011 { 2013.
- Faculty sponsor for Rhodes chapter of the Association of Women in Mathematics, 2011 { 2013.
- Departmental Liaison to the Mathematics Association of America (MAA), 2010 { present.
- Faculty advisor for Rhodes students participating in the COMAP Mathematics Contest in Modeling: Feb 2012 (two teams), Feb 2013 (two teams), Feb 2014 (two teams).
- Accompanied Rhodes students to Mathematics and Biomathematics conferences:
  - { 2017 BEER Symposium at Illinois State University, Normal, IL (7 students)
  - { 2016 BEER Symposium at College of Charleston in Charleston, SC (1 student)
  - { 2015 SMB Annual Meeting at Georgia State University in Atlanta, GA (3 students)
  - { 2014 BEER Symposium at Harvey Mudd College in Claremont, CA (2 students)
  - { 2014 SIAM Southeastern Atlantic Section conference at Florida Institute of Technology in Melbourn, FL (4 students)
  - { 2014 AMS Southeastern Spring Section meeting at the University of Tennessee, Knoxville, TN (4 students)
  - { 2014 MAA Southeastern Section meeting at Tennessee Tech in Cookeville, TN (1 student)
  - { 2013 BEER Symposium at Marymount University in Arlington, VA (1 student)
  - { 2013 MAA Southeastern Section meeting at Winthrop University in Rock Hill, SC (1 student)
  - { 2012 SMB Annual Meeting at the University of Tennessee, Knoxville, TN (4 students)
  - { 2012 BEER Symposium in St. Louis, MO (1 student)
  - { 2012 MAA Southeastern Section meeting at Clayton State University in Morrow, GA (8 students)
  - { 2011 MAA Southeastern Section meeting at the University of Alabama, Tuscaloosa (3 students)

Note: AMS = American Mathematica Society, BEER = Biomathematics and Ecology: Education and Research, MAA = Mathematics Association of America, SIAM = Society for Industrial & Applied Mathematics, SMB = Society for Mathematical Biology

Service to Department of Mathematics, University of Tennessee, Knoxville

- Organizer of Graduate Student Forum, 2008 { 2010.
- Graduate Teaching Mentor, 2007 { 2008.

Advised Student Research Total number of students advised in research: 28

= resulted in a publication  
see refereed pubs & preprints

Rhodes Senior Research Theses

Caroline Bush (Biomathematics Major), Samuel Crowell (Mathematics & Economics Double Major), Rainer Jones (Biomathematics Major), 2019. *Predicting the Potential Recovery of the Endangered Long-Live Epiphytic Bromeliad Tillandsia utriculata: an Agent-Based Modeling Approach.*

Colleen Hulsey (Biomathematics & Environmental Science Double Major), 2019. *Population Demographic Modeling of Native vs. Invasive Tree Popualtions.*

Jordan Ankersen (Mathematics Major), Erin Deery (Biomathematics Major), Cailey Kesselring (Mathematics Major), Casey Middleton (Biomathematics Major), and Elisabet Olsen (Biomathematics Major), 2018. *Transmission Dynamics & Initial Conditions of the 1878 Memphis Yellow Fever Epidemic.*

Zaid Ahmad (Biomathematics Major), 2018. *A Computation Investigation of Various Hallmarks of Cancer Cells.*

Brandon Bates (Mathematics Major), 2018. *Modeling the Evolution of a Rumor in a Close-Knit Community.*

Margaret Myers (Biomathematics Major), 2018. *Using Mathematical Modeling to Gain Insight into the Role of the CD<sup>4+</sup> T-Cell and Interferon- $\gamma$  Responses During In uenza Virus Infection.*

Mikayla Shorten (Biomathematics Major), 2017. *Modeling the spread and treatment of Ebolavirus in Sierra Leone.*

C. Andrew Williams (Biomathematics Major), 2017. *Modeling Water Terrorism*.

Terence Williams (Mathematics Major), 2017. *Modeling the Impact of Crime on Memphis High School Attendance & Graduation Rates*.

Connor Cook (Biomathematics Major), 2016. *Modeling the spread and treatment of Ebolavirus in Sierra Leone*.

Shelby Scott (Biomathematics Major), 2015. *An Agent-Based Model of Golden Eagle Predation on the Santa Cruz Island Fox*.

K. Lars Monia (Mathematics Major), 2015. *A Model of Proton Therapy using Discrete Diffusion*.

Elysia Hassen (Mathematics Major) and Rebecca Olivarez (Biomathematics Major), 2014. *A Predator-Prey Model Incorporating the Allee Effect into the Predator and Prey Populations*.

Joshua Berkey (Mathematics Major) and Devin Cochran (Mathematics Major), 2014. *Modeling the Zombie Apocalypse*.

Meagan Mansfield (Mathematics Major), 2013. *Modeling the Seasonality of Influenza Outbreaks in the United States*.

Carolyn Drobak (Mathematics Major), 2012. *Modeling the Hypothalamic Pituitary Adrenal Axis System with Dexamethasone Treatment*.

Melissa Coquelin (Mathematics Major), 2012. *Modeling Population Genetics*.

#### Rhodes Summer Biomathematics Research Fellowship

Brandon Bates, Summer 2017. *Modeling the Evolution & Spread of a Disease*



Diana Bigler (Chemistry Major), 2015.