Erin N. Bodine

Contact Information

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- 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

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

- Bodine, E.N. and Monia, K.L. A model of proton therapy using discrete di usion with an example of treating Hepatocellular carcinoma. *Mathematical Biosciences & Engineering*, 2017; 14(4): 881{899.
  [PDF] doi:10.3934/mbe.2017047

Bodine, E.N. and Yust, A. Predator-prey dynamics with intraspeci c competition and an Allee e ect in the predator population. *Letters in Biomathematics*, 2017; 4(1): 23{38.
[PDF] doi: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

- 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 E ect. *Letters in Biomathematics*, 2014; 1: 97{109.
  [PDF] doi: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

Bodine, E.N., Gross, L., Lenhart, S. Order of Events Matter: Comparing Discrete Di erence 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

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

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

Schwartz, E.J., Bodine, E.N., and Blower, S. E ectiveness and e ciency of imperfect therapeutic HSV-2 vaccines. *Human Vaccines* 2007; 3(6): 231{238.
[PDF] doi: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

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

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.
[PDF]

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

Bodine, E.N. Discrete Math Modeling with Biological Applications (Course Materials). (Version 2.0). *QUBES Educational Resources*. 2019. doi: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

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 27th*

Posters

□ = student coauthor(s)

- 2017 October 6: *Modeling the Evolution & Di usion 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 E ects 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 E ects 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 di erence 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 scienti c 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 & Scienti c 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 LaTeX Series: Beamer Presentations*. Graduate Student Forum Series, Department of Mathematics, University of Tennessee, Knoxville.

2009 October 13: *Graduate Student Forum LaTeX 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 ective 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 *Braaaiiinnnsss! 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

□ = resulted in a publication
see refereed pubs & preprints

Total number of students advised in research: 28

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*$^{+}$ *T-Cell and Interferon- , 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 Di usion*.

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

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

Meagan Mans eld (Mathematics Major), 2013. *Modeling the Seasonality of In uenza 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 & Spreap1s3 1(e)-469(Pmli01ormaon)-334(&)thMa Z*

Diana Bigler (Chemistry Major), 2015.