Erin N. Bodine

Contact Information	Department of Mathematics & Computer Science Rhodes College, 2000 N. Parkway, Memphis, TN 38112	*Office:* 901-843-3254 *E-mail:* bodinee@rhodes.edu

Research Interests

Mathematical Biology & Ecology (specifically ecological and population dynamics models that address issues of conservation & sustainability, and infectious disease modeling), Optimal Control Theory, Differential Equations, Difference Equations, Applied Mathematics, Agent/Individual-Based Modeling

Education

University of Tennessee, Knoxville, TN USA

Ph.D., Mathematics (concentration in Mathematical Ecology), August 2010

– Dissertation Topic: *Optimal Control of Species Augmentation*
– Advisers: Suzanne Lenhart and Louis J. Gross
– Areas of Study: applied mathematics, mathematical ecology, differential equations, optimal control

Harvey Mudd College, Claremont, CA USA

B.S., Mathematics, May 2003

B.A., Anthropology (with Honors), May 2003

Professional Experience

2017 –	*Associate Professor* Department of Mathematics & Computer Science, Rhodes College, Memphis, TN	
2010 – 2017	*Assistant Professor* Department of Mathematics & Computer Science, Rhodes College, Memphis, TN	
2009 – 2010	*Graduate Research Fellow* National Institute for Mathematical & Biological Synthesis, Knoxville, TN	
2006 – 2009	*Teaching Associate* Department of Mathematics, University of Tennessee, Knoxville, TN	
2005 – 2009	*Research Assistant* Department of Mathematics, University of Tennessee, Knoxville, TN	
2003 – 2005	*Research Assistant & Lab Manager* Biomathematics Department, University of California, Los Angeles, CA	
2002 – 2003	*Project Manager* Harvey Mudd Clinic Project with Overture Services, Inc., Claremont, CA	
2002	*Computer Programmer* Department of Mathematics, Harvey Mudd College, Claremont, CA	

Refereed Publications

★ = with student coauthor

Publication Count: 18

★ Scott, S.M., Middleton, C.E., and Bodine, E.N. An agent-based model of the spatial distribution & density of the Santa Cruz island fox: The Effects of Golden Eagle Predation & Island Fox Recovery. In *Integrated Population Biology & Modeling*, Vol. 40 of *Handbook of Statistics*. Elsevier, 2019; pp. 3–32.
[PDF] doi:10.1016/bs.host.2018.10.001

★ Ankersen, J., Kesselring, C., and Bodine, E.N. Modeling the effects of water treatment & removal in controlling yellow fever. *SPORA: A Biomathematics Journal*, 2018; 4(1): 42–50.
[PDF] doi:10.30707/SPORA4.1Kesselring

★ Bodine, E.N., Deery, E., and Middleton, C.E. The potential impact of using vaccination and insect repellent to control the spread of yellow fever. *SPORA: A Biomathematics Journal*, 2018; 4(1): 15–24.
[PDF] doi:10.30707/SPORA4.1Middleton

★ 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 diffusion 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 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

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 Effect. *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 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

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. Effectiveness and efficiency 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.

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

PREPRINTS

Bodine, E.N., Bush, C., Capaldi, A., and Jabaily, R. Quantifying differences in reproductive effort between iteroparous and semelparous reproductive strategies in Bromeliaceae. [Article: Submitted & Under Review]

Campbell, A., Myers, M., and Bodine, E.N. Modeling the effects of radiofrequency ablation treatment for cancer. [Article: In preparation]

Bodine, E.N., Bush, C., Crowell, S., and Jones, R. Predicting potential recovery of the endangered long-lived epiphytic bromeliad *Tillandsia utriculata*: an agent-based modeling approach. [Article: In preparation]

GRANTS

2018: *Faculty Development Endowment Grant*, Rhodes College, Memphis, TN.
Funding for *Writing an NSF Grant Proposal for Modeling Bromeliaceae Life History and Its Conservation Implications.*

2017: *Faculty Development Endowment Grant*, Rhodes College, Memphis, TN.
Funding for summer research project *Modeling the Impact of the Invasive Evil Weevil (Metamasius callizona) on the Endangered Giant Air Plant (Tillandsia Utriculata) Population of Florida.*

2015: *Faculty Development Endowment Grant*, Rhodes College, Memphis, TN.
Funding for summer research project *Modeling the Spread of Ebola in West Africa.*

2014: *Hill Grant for Curricular Development*, Rhodes College, Memphis, TN.
Funding for the development and review of course materials (reference readings, problem sets with solution guides, and lab projects with guiding tutorials) for a mid level discrete mathematical modeling course designed for freshman and sophomores interested in mathematical modeling or biomathematics.

2013: *Short Term Visitor*, National Institute for Mathematical & Biological Synthesis, Knoxville, TN.
Funding for visit to institute to collaborate with M.V. Martinez on optimal genetic augmentation research, and to collaborate with S. Lenhart and L.J. Gross on a math for life sciences undergraduate textbook.

TEXTBOOKS

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2014: *Hill Grant for Curricular Development*, Rhodes College, Memphis, TN.

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Funding for visit to institute to collaborate with M.V. Martinez on optimal genetic augmentation research, and to collaborate with S. Lenhart and L.J. Gross on a math for life sciences undergraduate textbook.

2013: *Grant for Summer Research Experiences for Undergraduates*, Associated Colleges of the South (ACS). Funding for a pilot program *New Paradigms for Collaborative Research in Mathematics Across the ACS*, in collaboration with Chris Camfield (Hendrix), Matthew Rudd (Sewannee), and Anne Yust (Birmingham-Southern).

2013: *Faculty Development Endowment Grant*, Rhodes College, Memphis, TN.
Funding for summer research project *Optimal Augmentation Strategies for Endangered Predator Populations.*

2012: *Faculty Development Endowment Grant*, Rhodes College, Memphis, TN.
Funding for summer research project *Finding Optimal Augmentation Strategies for an Endangered Population.*

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.

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SUBMITTED
GRANTS

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

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AWARDS

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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 Southeastern Atlantic Regional Conference on Differential Equations (SEARCDE)*
SEARCDE & Murray State University

2003: *Honors in Humanities and Social Sciences*
Harvey Mudd College

2000–2003: *American Business Woman Association Scholarship*
American Business Woman Association

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RESEARCH
PRESENTATIONS
☆ = INVITED

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2019 February 22: *Writing an NSF Grant Proposal for Modeling Bromeliaceae Life History & Its Conservation Implications.* Rhodes Faculty Development Endowment Grant Presentation, Rhodes College, Memphis, TN.

2018 October 7: *Yellow Fever: Lessons Learned from Modeling an Historic Outbreak.* 2018 Symposium on Biomathematics & Ecology: Education and Research at Arizona State University, Tempe, AZ.

2017 October 7: *Modeling the Conservation Impact of Differential Life History Strategies in Tillandsia utriculata & Tillandsia fasciculata – A Preliminary Report.* 2017 Symposium on Biomathematics & Ecology: Education and Research at Illinois State University, Normal, IL.

2017 June 24: *Using Mathematical & Computational Models to Understand Life History and Predict Outcomes of Conservation Strategies.* Summer 2017 Meeting of the Bromeliad Life History & Conservation Working Group at Marie Selby Botanical Gardens, Sarasota, FL.

2016 October 15: *Social Structure Algorithms for a Yellow-Bellied Marmot Population Model.* 2016 Symposium on Biomathematics & Ecology: Education and Research at College of Charleston, SC.

2016 January 7: *A Model of Proton Therapy using Discrete Diffusion with an example of treating Hepatocellular carcinoma.* Joint Math Meetings, Seattle, WA.

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2015 October 9: *Using an ABM to Explore the Effects of Climate Change on the Structure and Size of a Yellow-Bellied Marmot Population: A Preliminary Report.* 2015 Symposium on Biomathematics & Ecology: Education and Research at Illinois State University, Normal, IL.

☆ 2015 July 10: *Treating Cancer with Protons and Understanding the Predation of an Endangered Species: Two Examples of Discrete Models in Action.* Invited lecture to the Valparaiso Experience in Research by Undergraduate Mathematicians (VERUM) program.

2015 July 1: *Exploring Proton Therapy Treatment Regimes for Treating Cancer using a Discrete-Time Patch Model.* 2015 International Society for Mathematical Biology Conference in Atlanta, GA.

2014 October 12: *An Agent-Based Model of Santa Cruz Island Foxes Provides Evidence of an Allee Effect.* 2014 Symposium on Biomathematics & Ecology: Education and Research at Harvey Mudd College, Claremont, CA.

2014 March 29: *An Agent-Based Model of Santa Cruz Island Foxes Provides Evidence of an Allee Effect.* 38th Annual Society for Industrial & Applied Mathematics – Southeastern Atlantic Section Conference at Florida Institute of Technology, Melbourne, FL.

☆ 2014 March 21:*Optimal Genetic Augmentation Strategies for a Threatened Population: Exploring Sensitivity Analysis in an Optimal Control Problem.* Invited talk at American Mathematical Society Southeastern Spring Sectional Meeting at University of Tennessee, Knoxville, TN.

2014 March 4: *Optimal Genetic Augmentation Strategies for a Threatened Population.* Rhodes Faculty Development Endowment Grant Presentation, Rhodes College, Memphis, TN.

2013 October 12: *Optimal Genetic Augmentation Strategies for a Threatened Population.* 2013 Biomathematics & Ecology Education and Research Symposium at Marymount University in Arlington, VA.

2013 June 11: *Optimal Genetic Augmentation Strategies for a Threatened Population.* 2013 International Society for Mathematical Biology Conference in Phoenix, AZ.

2013 March 23: *Optimal Genetic Augmentation Strategies for an Endangered Population.* Session on Topics in Biology at 2013 Society for Industrial & Applied Mathematics – Southeastern Atlantic Section Meeting at the University of Tennessee, Knoxville, TN.

2013 January 22: *Optimal Genetic Augmentation Strategies for Endangered Populations.* Rhodes Faculty Development Endowment Grant Presentation, Rhodes College, Memphis, TN.

☆ 2012 January 7: *Bang-bang Optimal Control of Continuous Time Species Augmentation.* Invited talk at 2012 Joint Math Meetings AMS Special Session on Control of Biological and Physical Systems, Boston, MA.

2010 July 13: *Discrete Time Optimal Control of Species Augmentation: Comparing Order of Events.* Society of Industrial & Applied Mathematics 2010 Conference on Life Sciences, Pittsburgh, PA.

2010 March 26: *Discrete Time Optimal Control of Species Augmentation.* 2010 Mathematics Association of America – Southeastern Section Meeting at Elon University, Elon, NC.

2009 February 21: *Optimal control applied ot a model of species augmentation.* Clemson-Pitt-UTK-VT Graduate/Post Graduate Conference 2009 at Virginia Tech, Blackburg, VA.

2008 July 31: *Optimal control applied to a species augmentation model: The continuous time case.* 2008 Society of Mathematical Biology Conference, Toronto, Canada.

2007 October 20: *A simple optimal control model for species augmentation.* 27th Southeastern Atlantic Regional Conference on Differential Equations at Murray State University, Murray, KY.

☆ 2007 April 13: *The Utility of Math Modeling in Planning & Assessing Species Augmentation.* 2007 Computation Science for Natural Resource Managers Workshop, Knoxville, TN.

★ 2017 October 6: *Modeling the Evolution & Diffusion 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.

☆ 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 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

Math 113 – Mathematical Reasoning (Fall 2008, Summer 2008)

Math 151 – Math for Life Sciences I (Spring 2007)

Math 152 – Math for Life Sciences II (Spring 2008)

2006 – 2007, *Graduate Teaching Associate (Recitation Instructor)*, University of Tennessee, Knoxville

Math 151 – Math for Life Sciences I (Fall 2006, Fall 2007)

2009, *Graduate Teaching Associate (Lab Instructor)*, University of Tennessee, Knoxville

Math 171 – Computer Literacy for Mathematics (Spring 2009)

PROFESSIONAL
DEVELOPMENT

2017 July 24 – 28: *BioQuest 2017 Summer Workshop* in East Lansing, MI. Topic: Making Meaning through Modeling: Problem solving in Biology. A workshop for educators in biology to interface and an collaborator on pedagogy with mathematical modelers, computational modelers, and statisticians in order to better develop the quantitative skills of biology students.

2016 June 20 – 24: *BioQuest 2016 Summer Workshop* in Raleigh, NC. Topic: Lowering the Activation Energy: Making Quantitative Biology More Accessible. A workshop for educators in biology to interface and an collaborator on pedagogy with mathematical modelers, computational modelers, and statisticians in order to better develop the quantitative skills of biology students.

2015 August – November: *Faculty Mentoring Network on Teaching Quantitative Biology with Agent-Based Modeling and NetLogo* facilitated through the Quantitative Undergraduate Biology Education and Synthesis (QUBES) program at qubeshub.org. The network was designed for mathematics and biology educators to interface and collaborate on the use of agent-based modeling as a pedagogical tool in both biology and mathematics classrooms.

2014 March 14 – 15: *Project NExT–SE Workshop* at the 2014 Mathematics Association of America–Southeastern Section (MAA–SE) Annual Conference at Tennessee Tech in Cookeville, TN. A series of talks about teaching pedagogy, innovative teaching techniques, and professional development for Project NExT (New Experiences in Teaching) Fellows in MAA–SE.

2013 June 24 – 28: *Teaching Individual– and Agent–Based Modeling* in Chicago, IL. A workshop on how to successfully teach agent-based modeling to undergraduate students either as a full course which focuses solely on this topic, or as one topic in a course that broadly covers mathematical modeling. The workshop also provided a basic overview of agent-based modeling, best-practices in agent-based modeling, and the scope of applications to which agent-based modeling has been applied.

2012 – 2013: *Rhodes Scholarship Mentoring Program.* A mentoring program designed to provide guidance and clarify scholarship expectations for junior faculty. Participated as mentee for 2 semesters.

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: *Effective 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): 2014 (3 students), 2015 (4 students), 2016 (4 students), 2017 (3 students), 2018 (8 students)
  - Advisor for first-year students: Fall 2011 (5 students), Fall 2012 (5 students), Fall 2013 (5 students), Fall 2014 (5 students), Fall 2015 (5 students), Fall 2016 (5 students), Fall 2017 (8 students).
  - Advisor for Open Rhodes: Summer 2012 (17 students), Summer 2014 (21 students), Summer 2015 (16 students), Summer 2017 (11 students).
  - Advisor for senior research theses (see below).
- Search Committees:
  - Biology Department tenure-track search for an Environmental Biologist (external committee member)
  - Mathematics & Computer Science Department tenure-track search for Applied Statitician, Fall 2016 (departmental committee member)
  - Biology Department tenure-track search for Microbiologist, Fall 2015 (external committee member)
- Member of the Teaching & Academic Space Committee, Jan 2017 – Dec 2018.
- Member of department committee on reforming Calculus I, Applied Calculus, and Liberal Arts 100-Level Math Courses, 2014 – present.
- Committee member for the Environmental Studies and Sciences program, 2013 – present.

- 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-α,β Responses During Influenza 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 Cochrane (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 Information within a Close-Knit Community*

Caroline Bush, Summer 2017. *Modeling the Growth & Development of Tillandsia utriculata and Tillandsia fasciculata in Myakka River State Park, Florida*

Erin Deery, Summer 2017. *Modeling the Effects of Insect Repellent & Vaccination in Controlling Yellow Fever*

Cailey Kesselring, Summer 2017. *Modeling the Effects of Water Treatment & Removal in Controlling Yellow Fever*

Casey Middleton, Summer 2016. *Generating Social Structure Algorithms for an Agent-Based Model of a Yellow-Bellied Marmot Population*

Caroline Bush, Summer 2016. *Modeling Plant Resource Allocation in Bromeliaceae*

★ Mikayla Shorten, Summer 2015. *Modeling the Spread of Ebola Virus Disease in West Africa*

Margaret Myers, Summer 2015. *The Effects Proton Irradiation and Chemotherapy on a Discrete Diffusion Tumor Growth Model*

Shushangxuan Li, Summer 2014. *An Agent-Based Model of a Marmot Population Impacted by Climate Change*

Mary Moore, Summer 2014. *An Behavior-Based Model of the Memphis Zoo Elephant Population*

★ Shelby Scott, Summer 2013. *An Agent-Based Model of Santa Cruz Island Foxes which Exhibits an Allee Effect*

Elysia Hassen, Summer 2012. *Comparing predator-prey dynamics when Allee effect occurs within predator versus within prey*

Jize Zhang, Summer 2012. *Modeling seasonality in measles outbreaks using individual based models*

Robert Allen Scott Award Recipient

★ Casey Middleton, Summer 2017. *Modeling the Effects of Insect Repellent & Vaccination in Controlling Yellow Fever*

★ Mikayla Shorten, Summer 2016. *The Potential Impact of a Prophylactic Vaccine in West Africa.*

★ Connor Cook, Summer 2015. *Modeling the Spread of Ebola Virus Disease in West Africa.*

★ Shelby Scott, Summer 2014. *An agent-based model of golden eagle (Aquila chrysaetos) predation on the island fox (Urocyon littoralis santacruzae) of Santa Cruz Island.*

Rhodes Summer Biomathematics Research Award Recipient

Erin Deery, Summer 2017. *Modeling the Effects of Insect Repellent & Vaccination in Controlling Yellow Fever*

Biomathematics & Environmental Science Research (Math 451/452 and ENVS 451/452) Student Projects

Fall 2018
– *Predicting potential recovery of the endangered long-lived epiphytic bromeliad Tillandsia utriculata: an agent-based modeling approach.*
Caroline Bush (0 credits), Samuel Crowll (2 credits), Rainer Jones (2 credits)
– *Comparing demographics of semelparous & iteroparous life history strategies in Bromeliaceae using stage-structured matrix projection models.*
Zoe Brookover (1 credit), Alexandra Campbell (2 credits), Brian Christman (2 credits), Sydney Davis (2 credits)
– *Population demographic modeling of native vs. invasive tree populations.*
Colleen Hulsey (1 credit)

Spring 2018
– *Modeling the Transmission of Yellow Fever*
Jordan Ankersen (1 credit), Erin Deery (1 credit), Cailey Kesselring (4 credits), Casey Middleton (2 credits)
– *Modeling Life History & Conservation in Bromeliaceae*
Zoe Brookover (1 credit), Alexandra Campbell (1 credit), Brian Christman (1 credit)

Fall 2017
– *Modeling the Transmission of Yellow Fever*
Jordan Ankersen (1 credit), Erin Deery (1 credit), Cailey Kesselring (1 credit), Casey Middleton (2 credits)

Summer 2017
– *Modeling the Effects of Water Treatment & Removal in Controlling Yellow Fever*
Jo Ankersen (1 credit)
– *Modeling the use of Insect Sterilization in Controlling Yellow Fever*
Elisabet Olsen (1 credit)
– *Using Boolean Modeling Techniques to Understand Gene Regulation in Cancer*
Zaid Ahmad (1 credit)

Spring 2017
– *Modeling the Spread of Ebola Virus Disease in West Africa.*
Mikayla Shorten (4 credits)
– *Modeling Plant Resource Allocation in Bromeliaceae*
Caroline Bush (2 credits)
– *Modeling the Transmission of Yellow Fever in Memphis in 1878*
Jordan Ankersen (2 credits), Erin Deery (2 credits), Casey Middleton (1 credit), and Qianhui Sun (1 credit).

Fall 2015
– *Modeling the Spread of Ebola Virus Disease in West Africa.*
Connor Cook (4 credits)

Secondary Advisor on Rhodes Honors Theses

Diana Bigler (Chemistry Major), 2015. *MP2 and DFT Analysis of the Ligand Selectivity of a Sulfotransferase Enzyme: SULT 1A3.*

Kelly Allison (Chemistry Major), 2012. *MP2 and DFT Calculations of the Interaction Energies Between Boronated Aromatic Molecules and Small DNA Models: Applications to Cancer Therapy.*

PROFESSIONAL SOCIETY MEMBERSHIPS

American Mathematical Society (AMS)

Intercollegiate Biomathematics Alliance (IBA)

Mathematical Association of America (MAA) with participation in the Biomathematics Special Interest Group of the MAA (BIO-SIGMAA)

Society of Mathematical Biology (SMB)