Samantha Erwin

CONTACT INFORMATION

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EDUCATION

Virginia Polytechnic Institute and State University, Blacksburg, Virginia
Ph.D. Mathematics **May 2017**

- Dissertation Topic: "Mathematical models of immune responses to infectious diseases"

Virginia Polytechnic Institute and State University, Blacksburg, Virginia
M.S. Mathematics **June 2013**

- Thesis Topic: "Modeling of Passive Chilled Beams for use in Efficient Control of Indoor-Air Environments"

Murray State University, Murray, Kentucky
B.S. Mathematics **May 2011**

PROFESSIONAL EXPERIENCE

Oak Ridge National Laboratory, Oak Ridge, Tennessee
Research & Development Associate Staff Member **September 2019-Present**
Scientist in the Computing and Computational Sciences directorate working in the Biomedical Systems Engineering and Computing group. The group uses artificial intelligence and supercomputing to solve the nation's leading health initiatives.

North Carolina State College of Veterinary Medicine, Raleigh, North Carolina
Postdoctoral Research Scholar **July 2017-August 2019**
Based in Cristina Lanzas's lab in the Population Health and Pathobiology Department. I developed mathematical models of molecular mechanisms in *C. difficile* infection and of antibiotic resistance using nonlinear mixed effect models.

Biocomplexity Institute of Virginia Tech, Blacksburg, Virginia
Visiting Graduate Student **Fall 2014-Fall 2016**
I collaborated with bench-top scientist in the Nutritional Immunology and Molecular Medicine Laboratory (NIMML) to understand the effects in an HIV and HPV coinfection. I also participated in laboratory work to gain experience in experimental protocols.

Los Alamos National Lab, Los Alamos, New Mexico
Graduate Research Assistant **Summer 2015**
A summer research position at the Center for Nonlinear Studies where I modeled the effect of monoclonal antibodies in clinical trials. I worked directly with phase 1 clinical trial data develop a data driven model.

Interdisciplinary Center for Applied Mathematics, Blacksburg, Virginia
Research Assistant **Summer 2012 & 2013**
I developed computational fluid dynamic models for Halton chilled beams. I generated unique meshes based on manufacturers diagrams using Gmsh. I used these models in ANSYS Fluent to predict air flow in a closed room.

Murray State University, Murray, Kentucky
BioMaPS Fellow, Undergraduate Research **2010**
My collaborator (now Dr. Aron Huckaba) and I collected invasive plant samples, measured growth in different environments, and developed predictive mathematical models.

Refereed Publications

8. S Erwin*, LM Childs*, SM Ciupe. Mathematical model of broadly reactive plasma cell production *Scientific Reports*, 10(1), 1-12, 2020.
7. S Erwin, DM Foster, ME Jacob, MG Papich, C Lanzas. Mathematical model of the effects of antibiotics on antimicrobial susceptibility of enteric bacteria. *PLOS One*, 15(1):e0228138, 2020.
6. C Lanzas, K Davies, S Erwin, and D Dawson. On modelling enviromentally-transmitted pathogens *Interface Focus* 10:20190056, 2019.
5. SM Clifton*, CL Davis*, S Erwin*, G Hamerlinck*, et al. Modeling the argasid tick Ornithodoros moubata life cycle. *Understanding Complex Biological Systems with Mathematics*, 63-87, 2018.
4. JR Fletcher, S Erwin, C Lanzas, CM Theriot. Shifts in the gut metabolome and Clostridium difficile transcriptome throughout colonization and infection in a mouse model. *mSphere*, 3:e00089-18, 2018.
3. M Verma*, S Erwin*, V Abedi, S Hoops, R Hontecills, A Leber, J Bassaganya Riera and SM Ciupe. Modeling the mechanisms by which HIV-associated immunosuppression influences HPV persistence at the oral mucosa. *PLOS One*, 12(1):e0168133, 2017.
2. S Erwin and SM Ciupe. Germinal center dynamics during non-chronic and chronic disease. *Math Biosci Eng*, 14(3):655-71, 2017.
1. S Erwin*, A Huckaba*, KS He and M McCarthy. Matrix Analysis to Model the Invasion of Alligatorweed (Alternanthera philoxeroides) on Kentucky Lakes. *J Plant Ecol*, 6(2):150-7, 2013.

Other Publications

4. A 7-Day monitoring and forecasting tool for real-time COVID-19 situational awareness. [In-Preparation].
3. S Erwin, JR Fletcher, CM Theriot, C Lanzas. Understanding toxin production during Clostridioides difficile infection using high dimensional data. [In-preparation]
2. S Erwin, Mathematical models of immune responses to infectious diseases. PhD Dissertation, Virginia Polytechnic Institute and State University, April 4 2017.
1. S Erwin. Modeling of Passive Chilled Beams for use in Efficient Control of Indoor-Air Environments. Masters Thesis, Virginia Polytechnic Institute and State University, June 10 2013

* Denotes equal contribution

Software Skills

Most experienced: MATLAB, R, LaTeX, Maple, Monolix, ANSYS Fluent, Gmsh
Some experience: Mathematica, Unix, GROMACs, HTML, Python
Dabbled in: C, SQLite

Awards

General

SIAM Science and Policy Fellowship	2020 & 2021
Top 22 Under 40 – Murray State University Alumni Association	2019
Best poster award at the NC State Postdoctoral Research Symposium	2019
Favorite Faculty Award from the Division of Student Affairs at Virginia Tech	2016
Silver Oral Presentation at the VT Research Symposium	2016

Grants

Co-PI Joint DOE Laboratory Plan for Pandemic Modeling and Analysis Capability ($4,000,000)	2020
American Institute of Mathematics SQuaRE proposal accepted	2019
Finalist of the Comparative Medical Institute Seed Grant Competition	2018
Biology and Mathematics in Population Studies Fellowship ($10,000)	2010

Travel Awards ($9,125 in total)

Comparative Medical Institute, Society of Mathematical Biology, Montreal, Canada ($2,000)	2019
BAMM! Travel Award, BAMM!, Richmond, VA ($800)	2016, 2017 & 2019
AWM Travel Award, Society of Mathematical Biology, Sydney, Australia ($2,000)	2018
AMS Travel Grant, Joint Math Meetings, Atlanta, GA ($500)	2017
AMS Travel Grant, AMS Sectional Meetings, Raleigh, NC ($250)	2016
Virginia Tech Graduate Student Travel Fund Recipient ($390)	2015 & 2016
SIAM Student Travel Award, SIAM LS and Annual Meeting, Boston, MA ($650)	2016
Student Travel Award, SEARCDE, Greensboro, NC ($435)	2015

Landahl Travel Grant, SMB Annual Meeting, Atlanta, GA ($100) 2015
Student Travel Award, q-Bio, Albuquerque, NM ($1,300) 2014
Student Travel Award, SEARCDE, Winston-Salem, NC ($300) 2012
MathFest Travel Grant, MathFest, Pittsburg, PA ($300) 2010

NON-DEGREE & SHORT COURSES

NextProf Science Future Faculty Workshop, Ann Arbor, Michigan **May 2019**
This workshop is designed to encourage talented scientists and mathematicians with a demonstrated commitment to diversity to consider academia. The workshop helps scientists develop strategies to strengthen their abilities to pursue an academic career.

MBI, Women Advancing Mathematical Biology, Columbus, Ohio **April 2017**
This workshop tackled a variety of biological and medical questions using mathematical models to understand complex system dynamics.

Writing in the Sciences, Stanford, Online **Fall 2015**
Teaches scientists to become more effective writers, using practical examples and exercises. Topics included: principles of good writing, tricks for writing faster and with less anxiety, the format of a scientific manuscript, and issues in publication and peer review.

q-bio Summer School, Albuquerque, NM **August 2014**
The school intended to advance predictive modeling of cellular regulatory systems by exposing participants to a survey of work in quantitative biology and by providing in-depth instruction in selected techniques.

NIMBioS, Workshop for Women in the Mathematical Sciences, Knoxville, TN **April 2014**
Attended the three day workshop that familiarized women in the mathematical sciences with professional opportunities in academics, industry and government labs to help them thrive in mathematics-related fields.

SAMSI, Undergraduate modeling workshop, Raleigh, NC **Summer 2010**
Attended the weeklong workshop that focused on disease modeling. Researched and presented models on long-term influenza data.

PRESENTATIONS

Invited Talks

7. AMS Fall Sectional Meeting, (Canceled, COVID), Chattanooga, TN, October 2020.
6. Society of Mathematical Biology, Montreal, Canada, June 2019.
5. Virginia Tech Math-Bio Seminar Speaker, Blacksburg, VA, January 2019.
4. SIAM Life Sciences, Minneapolis, MN, August 2018.
3. Society of Mathematical Biology, Sydney, Australia, July 2018.
2. Virginia Commonwealth University Biomath Seminar Speaker, Richmond, VA, March 2018.
1. AMS Fall Southeastern Sectional Meeting, Raleigh, NC, November 2016.

Contributed Talks

21. **Session Chair:** SIAM Life Sciences, (Canceled, COVID) Garden Grove, CA, June 2020
20. Biology and Medicine through Mathematics, Richmond, VA, May 2019.
19. Women's Intellectual Network Research Symposium, Charlottesville, VA, September 2018.
18. Annual College of Veterinary Medicine Research Forum, Raleigh, NC, August 2018.
17. Biology and Medicine through Mathematics, Richmond, VA, May 2017.
16. **Session Chair:** Joint Math Meetings, Atlanta, GA, January 2017.
15. SIAM Annual Meeting and Life Science Conference, Boston, MA, May 2016.
14. Biology and Medicine through Mathematics, Richmond, VA, May 2016.
13. **Award Winner:** VT Graduate Student Research Symposium, Blacksburg, VA, March 2016.
12. SEARCDE, Greensboro, NC, October 2015.
11. Theoretical Biology and Biophysics Workshop, Los Alamos, NM, August 2015.
10. Center for Nonlinear Studies Student Seminar, Los Alamos, NM, August 2015.

9. Virginia Tech Graduate Student Research Symposium, Blacksburg, VA, March 2015.
8. SIAM Mid-Atlantic Student Conference, Fairfax, VA, March 2015.
7. 8th Annual q-Bio Summer School, Albuquerque, NM, August 2014.
6. 8th Annual q-Bio Student Symposium, Albuquerque, NM, August 2014.
5. SIAM Student Conference, Clemson, SC, February 2013.
4. Joint Math Meetings, New Orleans, LA, January 2011.
3. Nebraska Conference for Undergraduate Women in Math, Lincoln, NE, January 2011
2. NIMBioS, Knoxville, TN, November 2010
1. MathFest, Pittsburg, PA, August 2010

Posters

10. Society of Mathematical Biology, (Canceled, COVID), Heidelberg, Germany, September 2020
9. NC State University postdoctoral research Symposium, Raleigh, NC, May 2019
8. Center for Gastrointestinal Biology and Disease Research Day, Chapel Hill, NC, October 2018
7. NC American Society for Microbiology, Raleigh, NC, October 2017
6. Los Alamos Student Symposium, Los Alamos, NM, August 2015
5. Society of Mathematical Biology, Atlanta, GA, June 2015
4. q-Bio Conference, Santa Fe, NM, August 2014
3. Spring Opportunities Workshop for Women in the Math Sciences, Knoxville, TN, April 2014
2. Virginia Tech Graduate Student Research Symposium, Blacksburg, VA, March 2014
1. SIAM Graduate Student Poster Session, Blacksburg, VA, February 2014

Invited Panels

4. Early Career Workshop at SMB, (Canceled, COVID) Heidelberg, Germany, September 2020.
3. College of Veterinary Medicine Graduate Program Postdoctoral Panel, Raleigh, NC, October 2017.
2. Virginia Tech Mathematics Career Day, Blacksburg, VA, December 2016.
1. Nebraska Conference for Undergraduate Women in Math, Lincoln, NE, January 2014.

Teaching Experience

Oak Ridge National Laboratory, Oak Ridge, TN **2019 - Present**

Science Undergraduate Laboratory Internship

- Undergraduate student mentor — Summer 2020
- Virtual

NSF Mathematical Sciences Graduate Internship

- Graduate student mentor — Summer 2020
- Canceled - COVID

North Carolina State College of Veterinary Medicine, Raleigh, NC **2017 - 2019**

Teaching Assistant

- CBS 595: Infectious Disease Modeling — Spring 2018

Mentor

- Advised Hillary Dimig's undergraduate honors thesis. — Fall 2017- Spring 2018
- Thesis Topic: "Impact of intestinal antibiotic concentration on the microbiota and antimicrobial susceptibility of foodbourne pathogens"

Virginia Polytechnic Institute and State University, Blacksburg, Virginia **2011 – 2017**

Instructor of Record

- Math 2214: Differential Equations — Fall 2014, Spring 2015
- Math 1226: Calculus II — Spring 2016, Spring 2017
- Math 1225: Calculus I — Fall 2015, Fall 2016
- Math 1205: Calculus I — Fall 2012, Summer 2014
- Math 1016: Elementary Calculus with Trig — Summer 2012, Summer 2016

Teaching Assistant

- Math 2214, Differential Equations, Grader — Spring 2012
- Math 1224, Vector Geometry, Recitation Leader — Spring 2013, Spring 2014

- Math Emporium, assistant for 6 online courses — Fall 2011

Johns Hopkins, Center for Talented Youth, Haverford, PA — **Summer 2013**
Mathematical Modeling Instructor, independently developed unique and engaging curriculum and hands on activities for gifted middle and high school students. Also developed activities for my teaching assistant and mentored her in lesson preps and classroom teaching.

Service

National Service

SIAM Committee on Science and Policy	2020 - Present
Society for Mathematical Biology, Membership Chair	2019 - Present

Oak Ridge National Laboratory

Oak Ridge Computer Science Girls, Volunteer	2020
Hour of Code, Instructor at Bowers Elementary School	2019

North Carolina State Universtiy

College of Veterinary Medicine Postdoctoral Association President	2018
College of Veterinary Medicine Research Forum Poster Judge	2018
CMI Annual Research & Innovation Summit Poster Judge	2018

Virginia Tech

Math Department Representative, Graduate Student Assembly	Fall 2015-Spring 2016
Graduate Student Research and Development Program Reviewer	Fall 2014-Spring 2016
Vice President, Graduate Student Assembly	Fall 2014-Spring 2015
Computational Resources Committee Math Department	Fall 2014-Spring 2015
Graduate Student Representative, University Council	Fall 2013-Spring 2015
Graduate Student Research Symposium Abstract Reviewer	Fall 2014-Spring 2015
Student Budget Board	Spring 2015
Graduate Student Travel Fund Program Reviewer	Spring 2014 & Spring 2015
Secretary, Graduate Student Assembly	Fall 2013-Spring 2014
Member of the Commission on Graduate Studies and Policies	Fall 2013-Spring 2014
Co-President, Association for Women in Mathematics (AWM)	Spring 2012-Fall 2013
Math Department Representative, Graduate Student Assembly	Fall 2012-Spring 2013
GUMP mentor	Spring 2013

Murray State University

President, Pi Mu Epsilon	Fall 2010-Spring 2011
Vice President, Euclidean Math Club	Fall 2009-Spring 2011
Undergrad Rep, Zone 5 Intercollegiate Horse Show Assoc Ethics Committee	Fall 2009-Spring 2010
Public Relations, MSU Horseman's Club	Fall 2007-Spring 2009

Journal Reviewer

IEEE Access
Journal of Veterinary Pharmacology and Therapeutics
SIAM Undergraduate Research Online

Professional Societies

American Mathematical Society (AMS)
Association for Women in Mathematics (AWM)
Comparative Medicine Institute - Associate Member
Society for Industrial and Applied Mathematics (SIAM)
Society of Mathematical Biology (SMB)

Community Activities

New Life Center for Thoroughbreds, Board of Directors	2020-Present
Eventing at Virginia Tech	2014-2017
Educational Chair, Blue Ridge Eventing	2014-2015

Alumni Coordinator, Intercollegiate Horse Show Association Zone 5 Region 4 2011-2012

Intercollegiate Horse Show Association 2006-2011

- *2011 Individual National Champion*

Murray State Equestrian Team Captain 2008-2011