John W. Smith

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Research Interests

Modeling, forecasting, and simulation of complex dynamical systems, especially applications in ecology

Education

Ph.D. (Statistics) May 2022 (Expected)
Dissertation: *Ecosystem Models in a Bayesian State Space Framework*
Virginia Tech
Advisors: Leah Johnson (primary), Robert Quinn Thomas

M.S. (Statistics) May 2018
Virginia Tech

B.S. with Honors (Applied Mathematics) May 2016
Virginia Tech

Publications

In Review

John W. Smith, Leah R. Johnson, Robert Q. Thomas (2021), *Assessing Ecosystem State Space Models: Identifiability and Estimation*

Accepted

Abigail S. L. Lewis, Whitney M. Woelmer, Heather L. Wander, Dexter W. Howard, **John W. Smith**, Ryan P. McClure, Mary E. Lofton, Nicholas W. Hammond, Rachel S. Corrigan, R. Quinn Thomas, Cayelan C. Carey (2021), *Increased adoption of best practices in ecological forecasting enables comparisons of forecastability*, Ecological Applications, *to appear* <arXiv>

Lauren M. Childs, Fadoua El Moustaid, Zachary Gajewski, Sarah Kadelka, Ryan Nikin-Beers, **John W. Smith**, Melody Walker, Leah R. Johnson (2019), *Linked within-host and between-host models and data for infectious diseases: a systematic review*, PeerJ, DOI: 10.7717/peerj.7057

Mary Anne Steinberg, Cheryl Walther, Maria Herbst, Jennifer West, Dixie Zamagias, **John W. Smith** (2018), *Learning Specialists in College Athletics: Who are they and what do they do?*, Journal of Higher Education Athletics & Innovation, DOI: https://doi.org/10.15763/issn.2376-5267.2018.1.4.77-118

Research Experience

2018-Present **Doctoral Research, QED Lab at Virginia Tech**
Statistics
My dissertation research is focused on modeling complex ecosystem processes in a Bayesian State Space framework. In particular, I have worked on assessing unidentifiability of parameters in these ecosystem models, and altering existing approaches to accommodate common problems such as low observation data frequency and ecologically non-realistic error structures.

2019-2020 **Research Assistant, Virginia Tech**
Statistics
I worked on developing and implementing Bayesian Dynamic Energy Budget models to describe the life cycle of albatross. This involved writing and debugging C++ code used for model fitting and looking at diagnostics for fitted models.

2017-2020 **Statistical Application and Innovation Group at Virginia Tech**
Statistical Collaboration
I worked as a lead collaborator and statistical consultant for the statistical consulting center on campus. I worked on interdisciplinary projects, ranging from design of agricultural experiments to Bayesian population models. During my time at SAIG I also helped to create and teach a number of short courses for faculty and graduate students.

2014-2015 **NSF Funded Project, Yuriko Renardy at Virginia Tech**
Computational Fluid Dynamics
Worked as a co-principal investigator on the NSF funded project *Modeling and numerical simulation of yield stress fluids, and studies of viscoelasticity and confinement in the flow of two immiscible fluids* under Dr. Yuriko Renardy. I was tasked with running computer simulation experiments, editing ForTran code, and recording and analysing output from our computer model.

Teaching

Instructor of Record
VT STAT4106: Theoretical Statistics II, Fall 2019

As the instructor of record, I took the responsibilities of delivering lectures, holding office hours, and creating homework assignments, answer keys, and exams. In the summer before teaching this course, I heavily revamped the existing material for the course, including changing the curriculum to include new topics. My lecture notes, homework assignments, study guides, and exams can be found here. I am the first graduate student at Virginia Tech to teach this course.

Module and Short Course Development
VectorBiTE RCN, Summer 2021

The VectorBiTE RCN was interested in teaching more advanced topics in their workshop this year, and I was tasked with designing a short course titled Introduction to Bayesian State-Space models for Temporal Data. I taught the short course at the 2021 Virtual VectorBiTE RCN Training in July, and also assisted in teaching Bayesian Basics and Fitting Bayesian Models using JAGS. The materials and activities designed as well as the lecture videos can be found here.

Statistical Application and Innovation Group, Summer 2020

I revamped a SAIG short course called Data Visualization in R that is commonly taught to graduate students and faculty at Virginia Tech. In addition to making changes to this short course, I had a hand in revamping other short courses such as Data Manipulation in R and Machine Learning.

Teaching Assistant
Virginia Tech Statistics Department Fall 2016; Spring 2017; Fall 2017; Spring 2018

I have served as a teaching assistant for a variety of classes, including: Introductory Statistics, Statistical Methods, Statistics for Engineers, Introduction to Data Analytics, and Biological Statistics. For these courses I had a variety of duties, including creating answer keys for homework assignments, grading homework assignments, holding office hours, and lead recitation sessions.

Tutoring
Supervisor of Virginia Tech Mathematics Emporium Fall 2014 - Spring 2016

I served as the head of the tutoring lab at the Virginia Tech Math Emporium. Tutoring was provided for a wide variety of courses, including Calculus I - III, Differential Equations, Linear Algebra, and Vector Geometry. In addition to tutoring obligations, I attended a number of administrative meetings to help implement student feedback in the tutoring lab.

Honors and Awards

- Research Award Recipient: National Association of Academic and Student-Athlete Development Professionals (2018)
- Outstanding First Year Ph.D. Student (Statistics), Virginia Tech (2016)
- TW Hatcher Mathematical Scholar, Virginia Tech (2015)
- Carl A. Persinger Award (Mathematics), Virginia Tech (2015)
- TW Hatcher Mathematical Scholar, Virginia Tech (2014)

Presentations & Posters

Presentations

Bayesian Utility Analysis: A Hiring Simulation: College of Science Roundtable Advisory Board Meeting, Virginia Tech, March 2018

Bayesian Utility Analysis: A Hiring Simulation: Prospective Graduate Student Day, Virginia Tech, April 2018

Posters

Bayesian Parameter Estimation for Ecosystem State Space Models with Linear Autoregressive Process Models: Virginia Tech Corporate Partners Poster Session, October 2019

Bayesian Parameter Estimation for Ecosystem State Space Models with Linear Autoregressive Process Models: Spring Research Conference, Blacksburg, VA, May 2019

Bayesian Parameter Estimation for Ecosystem State Space Models with Linear Autoregressive Process Models: Ecological Forecasting Initiative Conference, Washington D.C., May 2019

Evaluating Path Choices During Hurricane Evacuations: Virginia Tech Corporate Partners Posterior Session, October 2017

Professional Activities & Organizations

Professional Service
Judge, CMDA Fall Data Competition Fall 2018
Volunteer, ASA DataFest Spring 2018; Spring 2019

Organizations
Mu Sigma Rho National Statistics Honor Society: Member 2017 - present
Phi Beta Kappa Honor Society: Member 2016 - present
Pi Mu Epsilon National Mathematics Honor Society: Member 2014 - present
Virginia Tech Mathematics Club: Member 2012 - 2016