ANDREW BRETTIN

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EDUCATION

PhD, Atmosphere-Ocean Science and Mathematics — **Expected 2025**
Courant Institute of Mathematical Sciences, New York University — *New York, NY*

Bachelor of Science, Mathematics — **May 2019**
University of Minnesota, College of Science & Engineering — *Minneapolis, MN*
Summa Cum Laude with High Distinction
GPA: 3.924

RESEARCH EXPERIENCE

Research Assistant (In progress) — **Summer 2020**
New York University

- Used GFDL CM 2.6 sea surface height and bathymetry data to investigate empirical relationships between coastal bathymetry and sea level

Undergraduate Research Intern — **Summer 2018**
REU in Computing Theory and Applications, DIMACS, Rutgers University

- Created a spatial model for neoplastic progression based on the theory of stochastic birth-death processes
- Adapted a framework for stochastically simulating chemical reaction-diffusion processes to efficiently model tumor growth

Developed a Python script to simulate and visualize tumor growth.

Undergraduate Research Intern — **Summer 2017**
Mathematical Biology REU, University of North Carolina at Greensboro

- Constructed a game-theoretic model for Ebola incorporating individuals' personal incentives to vaccinate
- Implemented a sensitivity analysis (Latin Hypercube Sampling) and an uncertainty analysis (Partial Rank Correlation Coefficients) in MATLAB

TEACHING EXPERIENCE

Grader, Honors Physics II — **Spring 2017**
Department of Physics, University of Minnesota

Tutor, Honors Calculus I–IV — **Fall 2016–Spring 2019**
University Honors Program, University of Minnesota

- Stimulated creative methods of critical thinking and problem solving
- Anonymous student comments:
  - "[The Calc I/II tutors] were always very present and helpful working through the problems with you. Not that the others weren't, I just noticed it particularly for these two."
  - "Andrew Brettin is especially helpful and kind, and he is a good teacher."

PUBLICATIONS

1. Andrew Brettin, Rosa Rossi-Goldthorpe, Kyle Weishaar, and Igor Erovenko. (2018). "Ebola could be eradicated through voluntary vaccination." *Royal Society Open Science* 5: 171591.
2. *(Under review)* Katherine Meyer, Andrew Brettin, James Broda, María Sánchez-Muñiz, Sarah Gorman, Forest Isbell, Sarah Hobbie, Mary Lou Zeeman, Richard McGehee. (2020) "Nitrogen-induced hysteresis in grassland biodiversity: A theoretical test of litter-mediated mechanisms." Submitted to: *American Naturalist*.

CONFERENCE PRESENTATIONS

María Sanchez-Muñiz, Kate Meyer, and Andrew Brettin. (May 2019). *Ecological Management Strategies Informed by Flow-Kick Dynamics*. Poster session presented at SIAM Conference on the Applications of Dynamical Systems, Snowbird, UT.

Andrew Brettin and Kyle Weishaar (November 2017). *Ebola Could Be Eradicated Through Voluntary Vaccination*. Undergraduate Research Conference at the Interface of Biology and Mathematics, Knoxville, TN.

Andrew Brettin (October 2017). *Ebola Could Be Eradicated Through Voluntary Vaccination*. Poster session presented at Council on Undergraduate Research REU Symposium, Alexandria, VA.

OTHER EXPERIENCE

Workshop on Climate Change and Resilience: Methods of Dynamical Systems and Data Assimilation — Summer 2018

American Institute of Mathematics, San Jose, CA

- Collaborated with other undergraduates and graduates involved with the Mathematics and Climate Research Network (MCRN) in various projects continuing throughout the academic year
- Investigated resilience of ecosystems to repeated perturbations using flow-kick dynamical systems
- Explored theoretical management practices for reducing the incidence of invasive species

Mathematical Contest in Modeling — Spring 2018

Consortium of Mathematics and its Applications

- Modeled the time evolution of the popularity of the 20 most prevalent native languages over the following 50 years using a discrete time dynamical system and publicly available migration data
- Utilized an economic gravity model to deliver an informed recommendation for optimal placement of international business offices based on the simulation results

TECHNICAL SKILLS

Programming languages and software: Python (packages: numpy, matplotlib, xarray, pandas), Java, Mathematica
Document preparation systems: LaTeX (document classes: article, beamer; packages: tikz, biblatex)

AWARDS & DISTINCTIONS

- **Henry M. MacCracken Fellowship,** New York University — 2019
- **Hans H. Dalaker Scholarship,** University of Minnesota — 2018
- **Gold Scholar Award,** University of Minnesota — 2015–2019
- **National Merit Scholar,** National Merit Scholarship Corporation — 2015