Katherine Slyman

Curriculum Vitae

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Academic Positions

NSF-RTG Postdoctoral Fellow, Brown University — *Jul 2023 - Present*
Division of Applied Mathematics
Postdoctoral Mentor: Bjorn Sandstede
Research Interests: Dynamical systems, opinion dynamics, modeling

Education

University of North Carolina at Chapel Hill, Chapel Hill, NC
Ph.D. Applied Mathematics — *May 2023*
Advisor: Christopher Jones
Disseration: Rate and Noise-Induced Tipping Working in Concert
Research Interests: Dynamical systems, noise and rate-induced tipping, climate applications

Wake Forest University, Winston-Salem, NC
M.A. Mathematics — *May 2017*

University of Delaware, Newark, DE
B.S. Secondary Mathematics Education — *May 2015*
Honors: *Cum laude*

Funding, Awards, Fellowships, and Honors

NSF-RTG Postdoctoral Fellowship — *Jul 2023 - Present*
Brown University, Division of Applied Mathematics

Senior Teaching Fellowship — *Aug 2022 - May 2023*
UNC-CH, Department of Mathematics
Fellowship awarded yearly to one math graduate student to co-teach a seminar with a faculty member for preparing first-year math graduate students to be effective TAs and instructors and serve as a liaison between graduate TAs and faculty instructors.

J. Burton Linker Award — *Spring 2022*
UNC-CH, Department of Mathematics
Granted to one math graduate student yearly for excellence in undergraduate teaching.

Student Travel Award — *Spring 2022*
SIAM Conference on Mathematics of Planet Earth

Student Travel Award — *Spring 2021*
SIAM Conference on Applications of Dynamical Systems

Student Travel Award — *Spring 2020*
SIAM Conference on Mathematics of Planet Earth

Graduate Teaching Assistantship — *Aug 2015 - May 2017*
Wake Forest University, Department of Mathematics and Statistics

Outstanding Student Teacher Certificate Award — *Spring 2015*
University of Delaware
Recognizes those who have demonstrated exceptional skill and creativity in developing rapport with students, planning and executing lessons, and incorporating suggestions and new ideas into teaching practice.

Summer Undergraduate REU Funding — *Summer 2014*
Miami University of Ohio

Secondary Education Award for Educational Promise *Fall 2014*
University of Delaware

Destination Delaware Scholarship *Aug 2011 - Spring 2015*
University of Delaware

Marching Band Nields Scholarship *Fall 2011, Fall 2012*
University of Delaware

Publications

Publications

Slyman, K., Gemmer, J., Corak, N., Kiers, C., & Jones, C.K. (2024). Tipping in a low-dimensional model of a tropical cyclone. Physica D: Nonlinear Phenomena, Volume 457, 133969.

Fleurantin, E., **Slyman, K.**, Barker, B., & Jones, C.K. (2023). A dynamical systems approach for most probable escape paths over periodic boundaries. Physica D: Nonlinear Phenomena, Volume 454, 133860.

Slyman, K., & Jones, C.K. (2022). Rate and noise-induced tipping working in concert. Chaos: An Interdisciplinary Journal of Nonlinear Science, 33(1), 013119.

Slyman, K. (2022). Alumni Panel Series Offers a Glimpse into Life as an Early-Career Mathematician. SIAM News: News journal of the Society for Industrial and Applied Mathematics, 55(3), 6.

Doughty, R., Gonda, J., Morales, A., Reiswig, B., Reiswig, J., **Slyman, K.**, & Pritikin, D. (2016). Arranging kings k-dependently on hexagonal chessboards. Involve, a Journal of Mathematics, 9(4), 699-713.

Preprints

No preprints at this time.

In Preparation

Matthews, J., Rao, Y., Robinson E., **Slyman, K.**, Konrad, K. Evaluating Simulated Vegetation Status of Earth System Models Using Satellite Climate Data Records.
Expected submission before June 2024.

Additional Research Experiences

North Carolina Institute for Climate Studies *May 2021 - Apr 2022*
Participated in a summer internship which was extended through the next academic year. Validated leaf area index of CMIP6 models and NOAA data using statistical measures.

American Institute of Mathematics *Summer 2020*
Dynamics and Data in the Covid-19 Pandemic Workshop
Participated in an NSF funded six-week workshop studying the spread of Covid-19 and various epidemiological models. Collaborated with a team to develop a dynamical systems model that looked at the effects of pathogen mutation and seasonal forcing in zoonotic spillover.

University of North Carolina at Chapel Hill *May 2018 - May 2020*
Performed statistical data analysis of single bead microrheology data sets to estimate subdiffusive properties of complex fluids with Dr. Greg Forest et. al.

Mathematics and Climate Research Network *Jul 2019 - Jul 2020*
Summer school program sponsored by AIM and the NSF that continued with online engagement for the next academic year. Studied the impact of noise on a dynamical systems model of El Nino under advisors Dr. John Gemmer and Dr. Mary Silber.

Miami University of Ohio Research Experience for Undergraduates *Summer 2014*

Researched discrete mathematics under the direction of Dr. Dan Pritikin. Attended short courses in Algebra and Analysis, participated in a technical writing seminar, and attended a workshop designed to prepare students for the GRE Math Subject Test. Attended colloquia featuring speakers from both academia and industry.

Scientific Activities

Invited Conference and Workshop Talks

1. *An Investigation of Tipping Mechanisms in a Carbon Cycle Model* — *Mar 2024*
   American Physical Society, March Meeting
   Minneapolis, MN
2. *Noisy Tipping in Nonautonomous Systems* — *May 2023*
   SIAM Conference on Applications of Dynamical Systems Minisymposium
   Portland, OR
3. *Rate and Noise Tipping Working in Concert* — *May 2021*
   SIAM Conference on Applications of Dynamical Systems

Invited Seminar Talks

1. *Noisy Tipping in Nonautonomous Systems* — *Nov 2023*
   New England Dynamics Seminar, Boston University
2. *The Interplay of Rate and Noise Tipping and Applications* — *Feb 2023*
   Biomath Seminar, Virginia Commonwealth University
3. *Noisy Tipping in Nonautonomous Systems* — *Jan 2023*
   Applied Math Seminar, Brigham Young University
4. *The Interplay of Rate and Noise Tipping and Applications* — *Nov 2022*
   Minnesota Mathematics of Climate Seminar, University of Minnesota
5. *Rate and Noise Tipping Working in Concert* — *Mar 2021*
   Applied Math Group Seminar, Wake Forest University

Contributed Talks

1. *The Interplay of Rate and Noise Tipping* — *Aug 2022*
   Critical Transitions and Nonautonomous Bifurcations Workshop
   Technical University Munich in Raitenhaslach
2. *Rate and Noise Tipping Working in Concert* — *Jul 2022*
   SIAM Conference on Mathematics of Planet Earth Minisymposium
   Pittsburgh, PA
3. *The Interplay of Rate and Noise Tipping* — *Apr 2022*
   Triangle Area Graduate Mathematics Conference, North Carolina State University
4. *Impact of Noise on a Dynamical Systems Model of El Niño* — *Aug 2020*
   SIAM Conference on Mathematics of Planet Earth
5. *Arranging Kings k-Dependently on Hexagonal Chessboards* — *Jan 2015*
   Poster Presentation, Joint Math Meetings
   San Antonio, TX

Seminar Talks

1. *Tipping in a Dynamical Systems Model of a Tropical Cyclone* — *Nov 2021*
   Physical and Applied Mathematics Lunch Seminar, UNC-CH
2. *Tipping in a Dynamical Systems Model of a Tropical Cyclone* — *Oct 2021*
   Graduate Mathematics Seminar, UNC-CH
3. *Introduction to Dynamical Systems and Tipping* — *Feb 2021*
   Graduate Mathematics Seminar, UNC-CH
4. *Impact of Noise on a Dynamical Systems Model of El Niño* — *Aug 2020*
   Physical and Applied Mathematics Lunch Seminar, UNC-CH

Other Workshops and Conferences Attended in Addition to the Above

1. Mathematics and Climate Research Network Meeting — *May 2023*
   Portland, Oregon
2. Triangle Area Graduate Mathematics Conference — *Feb 2023*
   Duke University
3. Joint Mathematics Meetings — *Jan 2023*
   Boston, MA
4. Dynamics Days — *Jan 2023*
5. Triangle Computational and Applied Mathematics Symposium — *Sep 2022*
   North Carolina State University
6. Clean Tech Summit — *Mar 2022*
   Chapel Hill, North Carolina
7. SIAM Conference on Mathematics of Planet Earth — *Jul 2022*
   Co-organized a Minisymposium
   Pittsburgh, PA
8. Mathematical and Computational Approaches to Social Justice — *Mar 2021*
   ICREM Workshop
9. Mathematical and Computational Methods for Complex Social Systems — *Jan 2021*
   AMS Short Course
10. Triangle Area Graduate Mathematics Conference — *Dec 2020*
11. Emergent Constraints and Tipping Point Workshops — *Nov 2020*
12. AIM Dynamics and Data of Covid-19 Pandemic Summer School — *Summer 2020*
13. Clean Tech Summit — *Feb 2020*
    Chapel Hill, North Carolina
14. Mathematics and Climate Research Network Summer School — *Summer 2019*
    Durham, NC
15. Graduate Student Topology and Geometry Conference — *Apr 2017*
    Michigan State University

Teaching Experience

Brown University

Postdoctoral Fellow — *Sep 2023 - Present*

Instructor of Record

- APMA 2190: Nonlinear Dynamical Systems (25 students) — *Fall 2023*
- APMA 1360: Applied Dynamical Systems (23 students) — *Spring 2024*

University of North Carolina, Chapel Hill

Graduate Teaching Assistant — *Aug 2018 - May 2023*

Instructor of Record

- Math 920: Teaching Seminar (17 students) — *Fall 2022*
- Math 381: Differential Equations (23 students) — *Summer 2022*
- Math 152: Calculus for Business and Social Sciences (46 and 50 students) — *Spring 2021,Fall 2021*
- Math 130: Precalculus (72 and 56 students) — *Fall 2019, Spring 2020*
- Short Course: Methods of Applied Math for the Comp (12 students) — *Summer 2020*

Recitation Leader

- Math 231: Calculus of Functions of One Variable I — *Spring 2019, Fall 2019*
- Math 232: Calculus of Functions of One Variable II — *Fall 2019*
- Math 290: Directed Exploration in Mathematics — *Summer 2019*

Grading
- Math 528: Mathematical Methods for Physical Sciences *Fall 2018*

Tutoring
- The Math Help Center *Fall 2018, Fall 2019*
  Provided tutoring for College Algebra through Multivariable Calculus.

Wake Forest University

Visiting Lecturer of Mathematics and Statistics *Aug 2017 - May 2018*

Instructor of Record
- MST 111: Calculus with Analytic Geometry I
  (Fall 2017, 3 sections - 30 students per section)
  (Spring 2018, 2 sections - 30 students per section)
- MST 113: Multivariable Calculus
  (Spring 2018, 1 section - 30 students)

Graduate Teaching Assistant *Aug 2015 - May 2017*

Grading
- MST 111: Calculus with Analytic Geometry I
- MST 113: Multivariable Calculus

Tutoring
- *Provided one-on-one tutoring in the Wake Forest University Math Center for Calculus I,II and Multivariable Calculus. Assisted students in course concepts during drop-in recitation sessions two nights per week.*

RJ Reynolds HS
Winston-Salem, NC

Mathematics Teacher *Aug 2017 - Dec 2017*

Courses Taught
- Honors Precalculus (30 students)
- AP Calculus AB (15 students)

Duke Talent Identification Program for Summer Studies

Instructor *Jun 2017 - Jul 2017*

Courses Taught
- Applying Mathematical Arts (20 students)
- Cryptography (20 students)

Rising Sun HS
Rising Sun, MD

Student Teacher *Jan 2015 - May 2015*

Courses Taught
- AP Statistics (2 classes, 10 and 13 students each)
- Trigonometry (2 classes, 30 students each)

Mentoring Activities

Directed Reading Program Mentor, Brown University *Fall 2023*
Topic: Dynamical Systems and Applications
Book: Differential Dynamical Systems, James Meiss
Student: Alessandra D'arcy

Directed Reading Program Mentor, UNC-CH *Spring 2021, 2022, 2023*
Topic: Introduction to Dynamical Systems
Book: Nonlinear Dynamics and Chaos, Steven Strogatz
Students: Bob Payne, Lexi Whiteside, Cindy Liu

Particle Tracking Mentor, UNC-CH *Summer 2019*
Mentored two high school students in particle tracking in single bead microrheology datasets.

North Carolina School of Science and Math Co-Mentor *Sep 2020 - May 2021*
Co-mentored with Dr. Christopher Jones in mentoring Owen Koppe studying epidemiological models on networks.

Williams College Co-Mentor *Sep 2020 - May 2021*
Co-mentored with Dr. Christopher Jones in mentoring Kasey Stern's senior thesis project on rate-induced tipping in an epidemiological model with rewiring.

Service

Brown University

Co-organizer Lefchetz Center for Dynamical Systems Seminar *Aug 2023 - Present*

University of North Carolina Chapel Hill

Graduate and Professional Student Government Senator *Aug 2022 - May 2023*

COMAP Triage Judge *Spring 2022, Spring 2023*

SIAM Student Chapter Co-President *Aug 2021 - May 2023*

Presidential Leadership Council Member *Aug 2021 - May 2022*
The Council is made up of graduate and professional student leaders from across departments within UNC. It is an interdisciplinary effort that seeks to mobilize graduate student voices for advocacy efforts.

Graduate Mathematics Association President *Aug 2021 - May 2022*

University Teaching Awards Committee Member *Fall 2021*
Invited to serve on the Board of Governor's Award for Excellence in Teaching subcommittee. Evaluated applications, observed faculty teaching and wrote observations, interviewed students, and participated in the final selection.

Directed Reading Program Committee Member *Jan 2021 - May 2023*

Climate Change Symposium Member *Dec 2019 - Aug 2020*
Worked with a group of graduate students across programs to represent Carolina Climate Change Scientists and put together a symposium to facilitate cross-campus discussion about climate change science and impacts.

Wake Forest University

Paisley IB Magnet School Outreach *Spring 2016 - Spring 2017*
Worked with middle school students on critical thinking skills and introduction to proofs by using a carefully selected set of problems.

Professional Development

Brown University

The Sheridan Teaching Seminar - Reflective Teaching Certificate *Fall 2023*
The Harriet W. Sheridan Center for Teaching and Learning

University of North Carolina Chapel Hill

Effective Mentoring Sessions *Mar 2023, Apr 2023*
The Graduate School

Energizing the Classroom: Active Learning and Evidence-based Teaching *Feb 2023*
The Graduate School

Pedagogies of Care and Compassion *Apr 2022*
The Center for Faculty Excellence

Partners for Equity in Teaching:
Academic Support Program for Student Athletes *Feb 2022*
The Center for Faculty Excellence

Beyond Think-Pair-Share: 10 Strategies for In-Class Small Groups *Feb 2022*
The Center for Faculty Excellence

Green Zone Training *Feb 2022*
The Center for Faculty Excellence

LGBTQ+ Allyship in the Classroom Workshop *Aug 2021*
Department of Mathematics

Workshop for Inclusive Teaching Practices *Dec 2020*
Department of Mathematics

Safe Zone Training *Nov 2020*
The LGBTQ Center

Facilitating Synchronous Student Interaction with Remote Teaching *Jul 2020*
The Center for Faculty Excellence

Teaching Assistant Seminar *Fall 2018*
Department of Mathematics

Popular Press Coverage

Gave an interview about my research for the article: *Nov 2021*
Francis, Matthew (2021). It's Not the Heat, It's the Rate: Rate-Inducted Tipping's Relation to Climate Change. SIAM News: News journal of the Society for Industrial and Applied Mathematics, 54(9), 6.

Volunteered to draw a female mathematician for AWM: *Sep 2020*
Portrait of Rodica Simion, AWM Mathematicians of EvenQuads Deck 1.
https://awm-math.org/publications/playing-cards/deck1/

Technology and Technical Skills

Teaching: Poll Everywhere, Explain Everything, Desmos, MyLabMath, WebAssign, Canvas, Sakai, Zoom, Piazza, Google Jamboard, Latex, Limnu

Programming: Python (intermediate, 6+ years), R (proficient, 3+ years), Mathematica (proficient, 3+ years), Matlab (proficient, 1+ years)