

Kaitlin Hill

385 Manchester Hall
2601 Wake Forest Rd
Winston-Salem, NC 271065

hillk@wfu.edu
210-414-1288
kaitlinhill.weebly.com

POSITIONS HELD

- Teacher-Scholar Postdoctoral Fellow 2019 - present
Wake Forest University, Department of Mathematics and Statistics
- MathCEP Postdoctoral Assistant Professor 2017 - 2019
University of Minnesota - Twin Cities, School of Mathematics

EDUCATION

Northwestern University

- Ph.D. in **Applied Mathematics** 2017
Advisor: Mary Silber
Thesis: Bifurcation analysis of a piecewise-smooth Arctic energy balance model

- M.S. in **Applied Mathematics** 2012

Baylor University

- B.A. in **University Scholars**, *cum laude* 2011
Concentrations: Mathematics, French
Honors programs: University Scholars, Baylor Interdisciplinary Core

RESEARCH INTERESTS

Applied dynamical systems, math modeling, mathematical geophysics, piecewise-smooth systems, bifurcation theory

PUBLICATIONS

1. C Horvat, L Roach, R Tilling, C Bitz, B Fox-Kemper, C Guider, K Hill, A Ridout, and A Sheperd. Estimating The Sea Ice Floe Size Distribution Using Satellite Altimetry: Theory, Climatology, and Model Comparison. *The Cryosphere*, 13 (2019), 2869-2885.
2. S Clifton, K Hill, A Karamchandani, E Autry, P McMahon, and G Sun. Mathematical model of gender bias and homophily in professional hierarchies. *Chaos*, 29 (2) (2019), 023135.
3. C Budd, P Glendenning, K Hill, R Kuske. Characterizing tipping in a stochastic reduced Stommel-type model in higher dimensions, *Research Perspectives CRM Barcelona*. Extended Abstracts Spring 2016, pp. 25-29.
4. K Hill, DS Abbot, and M Silber. Analysis of an Arctic sea ice loss model in the limit of a discontinuous albedo, *SIAM Journal on Applied Dynamical Systems*, 15 (2) (2016), 1163-1192.
5. J Hein, Z McCarthy, N Gaswick, B McKain, and K Speer. Laplace transforms for the nabla-difference operator. *Pan-American Mathematical Journal*, 21 (3) (2011), 79-96.
6. J Bohn, J Rebaza, and K Speer. Continuous threshold prey harvesting in predator-prey models. *International Journal of Computing Science and Mathematics*, 5 (2) (2011), 111-118.
7. B Hopkins, E Kim, J Lyons, and K Speer. Boundary data smoothness for solutions of nonlocal boundary value problems for second order difference equations. *Communications on Applied Nonlinear Analysis*, 16 (2) (2009), 1-12.

Also authored papers as K Speer.

PREPRINTS

- K Hill and R McGehee. Heat conduction through permafrost and its potential for explosive behavior. (2018) ArXiv:1810.12370.
- J Leifeld, K Hill, and A Roberts. Persistence of saddle behavior in the nonsmooth limit of smooth dynamical systems. (2015) ArXiv:1504.04671.

TEACHING EXPERIENCE**Instructor**, Wake Forest University

Created all course material; collaborated on final exam with other section instructors for 100-level courses

Topics Course: Numerical Methods for Differential Equations (MST 383/683)	Fall 2020
Ordinary Differential Equations (MST 251)	Spring 2020, Fall 2020
Integral Calculus of One Variable (MST 112)	Fall 2019, Spring 2020

Primary Instructor, University of Minnesota

Created all course material; coordinated other course instructors (UMTYMP) and grader (Math 4428, 4653)

Probability (Math 4653)	Spring 2019
Integral Calculus of One Variable (Math 1472 - UMTYMP)	Spring 2019
Differential Equations and Intro to Proofs (Math 1473 - UMTYMP)	Fall 2018
Mathematical Modeling (Math 4428)	Spring 2018
Linear Algebra (Math 2471 - UMTYMP)	Spring 2018
Differential Calculus of One Variable (Math 1471 - UMTYMP)	Fall 2017

Co-Instructor, University of Minnesota

Conducted weekly workshops

Integral Calculus with Multiple Variables (Math 2473 - UMTYMP)	Spring 2019
Differential Calculus of One Variable (Math 1471 - UMTYMP)	Fall 2018
Integral Calculus of One Variable (Math 1472 - UMTYMP)	Spring 2018
Vector Calculus (Math 2472 - UMTYMP)	Fall 2017

Instructor, Northwestern University

Created all course material (homework, assignments, exams, worksheets); sole-contact instructor

Integral Calculus of One Variable (Excel Program)	Summer 2016
Differential Calculus of One Variable (Excel Program)	Summer 2014

Teaching Assistant, Northwestern University

Held office hours; created quizzes; ran weekly discussion sections, including helping students with group work

Integral Calculus of One Variable	Fall 2016
Multiple Integration and Vector Calculus	Winter 2014

TEACHING PROFESSIONAL DEVELOPMENT

Peer Learning Workshop on Online Learning, Dept of Mathematics & Statistics, Wake Forest University	Jul 2020
Mastery Grading Conference, online due to COVID-19	Jun 2020
IBL Workshop, Academy of Inquiry Based Learning	Jun 2019
Project NExT (Blue Dot), Mathematical Association of America	2017 - 2018
Research Mentor Training, Center for the Integration of Research, Teaching, and Learning (CIRTL)	2017
Teaching Certificate Program, Searle Center for Teaching and Learning, Northwestern University	2014 - 2015

AWARDS & FELLOWSHIPS

Most Outstanding Graduate Student Research Poster, AWM poster session, Joint Mathematics Meetings	2017
Royal E. Cabell Terminal Year Fellowship, Northwestern University	2016 - 2017
NSF Graduate Research Fellowship	2013 - 2016

Microsoft Research Graduate Women's Scholarship	2012 - 2013
Walter P. Murphy Fellowship, Northwestern University	2011 - 2012
Regents' Gold Scholarship, Baylor University	2007 - 2011
United States Automobile Association National Merit Corporation Scholarship	2007 - 2011
Girl Scout Gold Award	2008

UNDERGRADUATE MENTORING

<i>Characterizing tropical cyclone intensity</i> Brandon Freeman, Independent Research Project	2019 - 2020
<i>Permafrost recession and potential for carbon feedback</i> John Nguyen, Undergraduate Research Opportunities Program (faculty mentor Richard McGehee) Submitted manuscript: J Nguyen and A Zebrowski, Adapting the Budyko model to analyze permafrost recession and potential for carbon feedback	2018 - 2020
<i>Food trade networks</i> Yuqing Wang, Independent Research Project Contributed talk: 2019 Pi Mu Epsilon Conference, St. John's University, Collegeville, Minnesota	2018 - 2019
<i>Agent-based modeling of advancement in professional hierarchies</i> Jennifer Ai, Jake Berran, Mitchell VonEschen, UMTYMP student project Contributed talk: 2019 Pi Mu Epsilon Conference, St. John's University, Collegeville, Minnesota	Spring 2019
<i>Comparison of models of the opioid epidemic</i> Thomas Cushing, Senior Project (Writing Intensive)	Spring 2019
<i>Applications of Monte Carlo methods</i> Qinai Xu, Senior Project (Writing Intensive)	Fall 2018
<i>Dynamics of the cusp normal form with periodic forcing</i> Mark Pekala and Antonia Ritter, UMTYMP student project	Spring 2018
<i>Spread of White Nose Syndrome in bat networks</i> David Li and Grace O'Brien, UMTYMP student project	Spring 2018

GRANTS

General

NSF Division of Mathematical Sciences - Applied Mathematics Most probable tipping events in stochastic piecewise-smooth systems research grant submitted, Co-PI with PI John Gemmer	2020 - 2023
MAA Tensor Women and Mathematics Grant GLEAM: Girls Learning and Exploring Applications of Mathematics \$5,000 outreach grant, Co-PI with PI Kathryn McCormick \$4,683 outreach grant	2019 - 2020 2018 - 2019
AMS Mathematics Research Communities Micro-conference Grant MRC on Differential Equations, Probability, and Sea Ice Micro-conference \$4,185 conference grant, joint with Alice Nadeau	2018

Travel

SIAM Early Career Travel Award, to SIAM Conference on Applications of Dynamical Systems	2019
AWM Travel Grant, to SIAM Conference on Mathematics of Planet Earth	2018
AWM Student Travel Award, to Joint Mathematics Meetings	2017
SIAM Student Travel Award, to SIAM Conference on Applications of Dynamical Systems	2015
Mathematics and Climate Research Network Mini-grant Persistence of bifurcation structures in the nonsmooth limit of smooth dynamical systems	2014 - 2015

\$4,000 research grant, joint with Andrew Roberts and Julie Leifeld

Mathematics and Climate Research Network Mini-grant

2013 - 2014

Course module: Testing methods for the detection of critical transitions

\$2,177 curriculum development grant, joint with Mary Lou Zeeman, Mary Silber, Sarah Iams, and Karna Gowda

INVITED PRESENTATIONS

- “Most probable tipping events in a stochastic energy balance model” Jul 2020
SIAM Conference on Mathematics of Planet Earth, cancelled due to COVID-19 (*Minisymposium talk*)
- “Optimal path choice through a switching manifold” Nov 2019
SIAM Texas-Louisiana Sectional Meeting, Dallas, Texas (*Minisymposium talk*)
- “Permafrost melt and its effects on planetary energy balance” May 2019
SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (*Minisymposium talk*)
- “Permafrost melt and its effects on planetary energy balance.” Sept 2018
Midwest/McGehee Dynamical Systems Conference, Minneapolis, Minnesota
- “Resilience of food networks.” May 2018
CLIM Transition Workshop, Statistical and Applied Mathematical Sciences Institute (SAMSI), North Carolina
- “Analysis of an Arctic Sea Ice Model in a Nonsmooth Limit.” June 2016
School/Workshop on Applicable Theory of Switched Systems, Dallas, Texas
- “Conceptual dynamical systems: an introduction, with applications to Arctic energy balance.” May 2016
8th Annual Mathematical & Statistical Modeling Workshop, Northeastern Illinois University, Chicago, Illinois
- “Analysis of an Arctic Sea Ice Model in a Nonsmooth Limit.” May 2015
SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (*Minisymposium talk*)

CONTRIBUTED PRESENTATIONS & POSTERS

- “A mathematical model of gender bias and homophily in professional hierarchies.” Jan 2019
Joint Mathematics Meetings, Baltimore, Maryland
- “GLEAM: Girls Learning and Exploring Applications of Mathematics.” Jan 2019
Poster presentation, Joint Mathematics Meetings, Baltimore, Maryland
- “Analysis of an Arctic Sea Ice Model in a Nonsmooth Limit.” Jan 2017
Poster presentation, Joint Mathematics Meetings, Atlanta, Georgia
- “Energy balance models and the cryosphere: recent studies and open questions.” Mar 2016
Intensive Research Program on Advances in Nonsmooth Systems: Climate Modeling Workshop, Barcelona, Spain
- “Analysis of an Arctic Sea Ice Model in a Nonsmooth Limit.” Jan 2016
Joint Mathematics Meetings, Seattle, Washington
- “Analysis of an Arctic Sea Ice Model in a Nonsmooth Limit.” Sept 2015
Poster presentation, Conference on the Mathematics of Sea Ice, Vancouver, Canada
- “An Arctic Sea Ice Model: Analysis in the Discontinuous Albedo Limit.” Sept 2013
Poster presentation, Tipping Points: Fundamentals and Applications, International Centre for Mathematical Sciences, Edinburgh, Scotland
- “An Arctic Sea Ice Model: Analysis in the Discontinuous Albedo Limit.” May 2013
SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah
- “Fractional Nabla-Difference Calculus.” (with N Gaswick, J Hein, S McCarthy, and B McKain) Jan 2011
Poster presentation, Joint Mathematics Meeting, New Orleans, Louisiana

COLLOQUIUM TALKS

Colloquium, Department of Mathematics & Statistics, Wake Forest University (online due to COVID-19)	Apr 2020
Colloquium, Department of Mathematical Sciences, Appalachian State University	Mar 2020
Applied Math Seminar, University of North Carolina - Greensboro	Nov 2019
Colloquium, Department of Mathematical Sciences, University of Texas - Dallas	Nov 2019
Analysis Seminar, Wake Forest University	Sept 2019
“Chaos and the weather”, UMTYMP Seminar, University of Minnesota	Apr 2019
Women in Math Intro to Research Day, University of Minnesota	May 2018
“Problem- vs. Project-Based Learning in Math 4428”, MathCEP Seminar, University of Minnesota	Mar 2018
Dynamical Systems Seminar, University of Minnesota	Jan 2018
Climate Seminar, University of Minnesota	Sept 2017

ADDITIONAL RESEARCH CONFERENCES & WORKSHOPS ATTENDED

Rising Stars in Computational and Data Sciences Workshop, online due to COVID-19	Oct 2020
MAA MathFest, Denver, Colorado	Aug 2018
MAA MathFest, Chicago, Illinois	Aug 2017
Communicating Science workshop (ComSciCon-Chicago), Chicago, Illinois	Aug 2015
Mathematics Research Community on Differential Equations, Probability, and Sea Ice, Snowbird, Utah	Jun 2015
Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference,	Oct 2013
Community Earth System Model 1.2 Tutorial, National Center for Atmospheric Research (NCAR)	Aug 2013

ACADEMIC SERVICE**Profession**

Reviewer for	
<i>Chaos</i>	2019 - 2020
<i>PLOS One; The Journal of Mathematical Sociology</i>	2019
<i>Nature Partner Journal: Climate and Atmospheric Science; AMMCS Proceedings; SIAM Textbooks</i>	2018
F-GAP Program Facilitator, Math Alliance	2019 - 2020
Managing Editor, <i>Minnesota Journal of Undergraduate Mathematics</i>	2017 - 2019
Poster Judge, MAA Undergraduate Poster Session, Joint Mathematics Meetings	Jan 2019
Host Site Coordinator, SIMIODE Challenge Using Differential Equations Modeling, University of Minnesota	Apr 2018
Triage Judge, COMAP Mathematical Contest in Modeling	Feb 2018
Nonsmooth Systems Focus Group Organizer, Mathematics and Climate Research Network	2013 - 2016

Department and University

Curriculum Committee Member, Dept of Mathematics & Statistics, Wake Forest University	2020 - 2021
Expert Advisor, Wake Forest student team, Student Cluster Competition 2020	2020
Library Committee Member, Dept of Mathematics & Statistics, Wake Forest University	2019 - 2020
Hiring Committee Member, MathCEP Postdoctoral Assistant Professor, University of Minnesota	2017 - 2019
Assistant Faculty Coordinator, College in the Schools - MATH 1371, University of Minnesota	2017 - 2019
Panelist, Graduate Teaching Spring Symposium, Northwestern University	Apr 2017
Math Placement Advisor, McCormick School of Engineering, Northwestern University	2014, 2016
Co-chair, Applied Math Department Student Board, Northwestern University	2013 - 2015

Conference and Session Co-Organizing

Minisymposium on Modeling female and minority representation in society	May 2019
SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah	
Differential Equations, Probability and Sea Ice MRC Micro-conference	Sept 2018

Philadelphia, Pennsylvania

Minisymposium on Mathematical Methods for Conceptual Climate Modeling: From Deterministic to Stochastic	Sept 2018
SIAM Conference on Math of Planet Earth, Philadelphia, Pennsylvania	
Project NExT panel on Incorporating Social Justice Projects into the College Mathematics Curriculum	Jan 2018
Joint Mathematics Meetings, San Diego, California	
Climate Modeling Workshop	Mar 2016
Intensive Research Program on Advances in Nonsmooth Systems, Barcelona, Spain	
Special Session on Differential Equations, Probability, and Sea Ice	Jan 2016
Joint Mathematics Meetings, Seattle, Washington	

OUTREACH

GLEAM: Girls Learning and Exploring Applications of Mathematics, University of Minnesota	
Volunteer	2019 - 2020
Founder, Director	2018 - 2019
Academic Director, UMN-IMA Math Modeling Camp, University of Minnesota	Jul 2017, 2018, 2019
Instructor, <code><run>: \the\world</code> Machine Learning Camp, University of Minnesota	Jun 2018
Instructor, UMTYMP Summer Camp, University of Minnesota	Jun 2017, 2018
Co-Director, Girls Mentor Network, UMTYMP, University of Minnesota	2017 - 2019
Volunteer, Planet Earth station, National Math Festival, Washington, D.C.	Apr 2017
Speaker, Applied Math in Action, Chicago, Illinois	Fall 2015, Fall 2016
Challenge Lead, Science Pentathlon, Evanston/Skokie School District No. 65, Evanston, Illinois	May 2014
Co-Leader, Girl Scout Troop 40060, Evanston, Illinois	2014 - 2016

TECHNICAL SKILLS

Languages and Programs: Matlab, Mathematica, XPPAut, Auto, Netlogo, R
 Teaching: Geogebra, WebAssign, WeBWorK, Sakai, Moodle, Blackboard, Canvas

PROFESSIONAL MEMBERSHIPS

Math Alliance	Society for Industrial and Applied Mathematics (SIAM)
Mathematical Association of America (MAA)	Mathematics and Climate Research Network (MCRN)