

Katherine J. Meyer

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EDUCATION

University of Minnesota, Minneapolis, MN

PhD, Mathematics expected 2019
MS, Mathematics 2016
Research areas: dynamical systems, disturbance dynamics, ecological modeling

Smith College, Northampton, MA

Post-bac certificate, Mathematics 2012

Carleton College, Northfield, MN

BA, Biology, *summa cum laude* 2009

RESEARCH EXPERIENCE

University of Minnesota

Department of Mathematics 2013–present
Advisor: Richard McGehee
Thesis: Measuring dynamic attractor intensity using bounded control

Institute on the Environment 2017–2018
Advisors: Sarah Hobbie and Forest Isbell
Modeled mechanisms of bistability and hysteresis to complement decadal-scale experiments in polluted grasslands.

Math Climate Research Network

Resilience Working Group 2014–present
Leader: Mary Lou Zeeman
Quantified resilience to repeated discrete shocks in otherwise continuous dynamical systems to support natural resource decision-making.

Harvard Medical School

Genetics Department 2009–2010
Principal Investigator: Monica Colaiácovo
Studied meiotic protein functions in the model organism *Caenorhabditis elegans*.

PUBLICATIONS

- Meyer K**, Hoyer-Leitzel A, Iams S, Klasky I, Lee V, Ligtenberg S, Bussmann E, and Zeeman ML (2018) Quantifying resilience to recurrent ecosystem disturbances using flow-kick dynamics. *Nature Sustainability* 1(11):671-678.
- Meyer K**. Extinction debt repayment via timely habitat restoration. *Theoretical Ecology, early view*, <https://doi.org/10.1007/s12080-018-0395-y>.
- Zeeman ML, **Meyer K**, Bussmann E, Hoyer-Leitzel A, Iams S, Klasky I, Lee V, and Ligtenberg S (2018) Resilience of socially valued properties of natural systems to repeated disturbance: a framework to support value-laden management decisions. *Natural Resource Modeling*, e12170, doi 10.1111/nrm.12170.
- Guswa AJ, Hamel P, and **Meyer K** (2018) Curve number approach to estimate monthly and annual runoff and baseflow. *Journal of Hydrologic Engineering* 23(2): doi 10.1061/(ASCE)HE.1943-5584.0001606.
- Meyer K** (2016) A mathematical review of resilience in ecology. *Natural Resource Modeling* 29(3): 339–352.
- Saito TT, Lui DY, Kim HM, **Meyer K**, and Colaiácovo MP (2013) Interplay between structure-specific endonucleases for crossover control during *Caenorhabditis elegans* meiosis. *PLOS Genetics* 9(7): e1003586.
- Saito TT, Mohideen F, **Meyer K**, Harper WJ, and Colaiácovo MP (2012) SLX-1 is required for maintaining genomic integrity and promoting meiotic noncrossovers in the *Caenorhabditis elegans* germline. *PLOS Genetics* 8(8): e1002888.

INVITED TALKS

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| <i>Measuring attractor intensity using nonautonomous control</i>
Midwest Dynamical Systems Conference, Minneapolis, MN | Nov. 2018 |
| <i>Mentoring undergraduate math research on the reversibility of sea ice loss</i>
SIAM Conference on Applied Mathematics Education, Portland, OR | Jul. 2018 |
| <i>Flow-kick systems: dynamic models of ecosystem disturbance and resilience</i>
Hamline University, St. Paul, MN | Oct. 2017 |
| <i>Emerging models of resilience: Introduction</i>
SIAM Snowbird Conference on Applications of Dynamical Systems | May 2017 |
| <i>Go with the flow until you get kicked</i>
Normandale Community College, Bloomington, MN | Nov. 2016 |
| <i>Potential quantitative meanings of resilience</i>
JMM AMS Special Session on Natural Resource Modeling, Seattle, WA | Jan. 2016 |

SELECTED PRESENTATIONS

- Why does biodiversity fail to recover in formerly polluted grasslands?* Mar. 2018
CRITICS Winter Workshop, Wöltingerode, Germany
- Beyond basin size: Prospects for quantifying resilience using dynamical systems* Oct. 2015
Minnesota Mathematics Junior Colloquium
- Modeling resilience of natural systems*, poster Jun. 2015
Math of Planet Earth 2013+ Workshop on Mgmt. of Natural Resources
- Talks in Mathematics of Climate Seminar (ten)* 2014–2018
University of Minnesota

HONORS AND AWARDS

- Interdisciplinary Doctoral Fellowship, UMN Institute on the Environment 2017–2018
- SIAM Student Travel Award to attend Snowbird Conference, UT May 2017
- NSF Graduate Research Fellowship 2014–2017
- UMN College of Science and Engineering Fellowship 2013–2014

RESEARCH ADVISING

- Math Climate Summer Research Program** 2018
Developed research topics that undergraduate and beginning graduate students explored during summer workshop at AIM. Synthesized questions from resilience modeling group and grassland biodiversity ecologists and produced three pre-workshop training videos. Advised projects during weeklong in-person workshop and online thereafter.
- Minnetonka High School Research Program** 2016–2018
Helped high school student Erika Bussmann analyze the dynamics of multiplicative harvest events and logistic population growth; she contributed as a co-author on two papers.
- Undergraduate Research Opportunity Program** Spring 2017
Mentored University of Minnesota math major Jessica Knighton on exploring whether sequestering carbon via biochar production from perennial grasslands could be a viable business model. Projected culminated with poster presentation at University-wide session.
- College of Liberal Arts Senior Capstone Project** 2015–2016
Advised undergraduate math major Sarah Pierro at University of Minnesota on identifying and answering a research question on the reversibility of greenhouse gas impacts in a single-column sea ice model. Sarah completed a math Masters degree at the University of Minnesota–Duluth in 2018.

TEACHING

Courses taught at the University of Minnesota unless otherwise noted.

Instructor of Record

Finite Math (MATH 101) <i>University of St. Thomas, St. Paul, MN</i>	Fall 2018
Applied Linear Algebra (MATH 4242, $\frac{1}{4}$ term)	Summer 2018
Calculus I (MATH 1271)	Summer 2017
Climate Change: Past, Present, and Future <i>Osher Lifelong Learning Institute, Minneapolis, MN</i>	Winter 2017
College Algebra & Probability (MATH 1031)	Summer 2015

Teaching Assistant

Honors Calculus II (MATH 1572)	Spring 2018
Linear Algebra and Differential Equations (MATH 2243)	Fall 2016
Multivariable Calculus (MATH 2263)	Spring 2015
Calculus I (MATH 1271)	Spring 2014 & Fall 2013

Guest Lecturer

Math for Liberal Arts: Energy and Climate Change (MATH 1020) <i>Normandale Community College, Bloomington, MN</i>	Spring 2018
Sustainable People, Sustainable Planet (SUST 3003)	Fall 2015

Professional Development

Student Seminar on Undergraduate Math Education (co-organizer) Facilitated workshops on topics like group work, mid-semester feedback, and course design. Arranged peer observations and managed repository of teaching materials.	2017–2018
Difficult Dialogues Workshop: How to Be a Better Ally (participant) <i>SIAM Annual Meeting, Portland, OR</i>	Jul. 2018
Preparing Future Faculty Program (participant) Completed two-semester course sequence, reflected on best practices in teaching and faculty roles in higher education.	2016–2018

SERVICE

- Peer Mentor to Incoming Graduate Students** 2014–present
Provided support and information to first year math graduate students on topics from finding housing in the Twin Cities to adjusting to graduate coursework and teaching.
- Organizer, SIAM Snowbird Minisymposium** May 2017
Led “Emerging Models of Resilience” session, discussing theoretical and experimental approaches for quantifying resilience across a range of socio-ecological systems.
- Co-organizer, Math of Planet Earth at the National Math Festival** Apr. 2017
Co-led development of hands on materials for the session: “Climate, Math, Ice Cores, and You: Hands-On Data from Planet Earth” at the National Math Festival in Washington, D.C. The festival drew 20,000 math lovers of all ages.
- News Liaison, Society for Industrial and Applied Mathematics** Oct. 2016
Identified speakers from the 2016 Mathematics of Planet Earth conference to contribute broader articles about their work to a special MPE-themed issue of SIAM News.
- Girls Solve It! MathBio Camp Conservation Day** Aug. 2016, 2017
Led group of 30-32 high school girls in MATLAB exploration of sea turtle conservation strategies using Lefkowitz stage matrices.
- Panelist on Applying to Fellowships** 2015–2018
Shared experiences and advice regarding the NSF Graduate Research Fellowship application to first and second year graduate students during six different panel sessions.
- TeachingSMART Elementary School Outreach** 2014–2016
Led enriching math activities including John Conway’s rational tangles, Mobius strip explorations, and coordinate system treasure hunts for local elementary school students.
- MCRN¹ Website Administrator** 2015–2016
Developed collaborative Hub research website (<https://mcrn.hubzero.org/>) for distributed network of climate-math collaborations encompassing over 300 researchers.
- Ecology Fair Interviewer** 2015
Facilitated presentations by elementary and middle school students on their ecological projects at UMN Monarch Lab’s annual science fair.
- Minnesota State Fair Mathematics Outreach** 2015
Engaged public in origami folding and represented UMN mathematics in the fair’s Education Building.

¹Math Climate Research Network