Anna C. Nelson

CONTACT INFORMATION

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RESEARCH INTERESTS

Applied dynamical systems, mathematical biology, polymerization, mathematical modeling

ACADEMIC APPOINTMENTS

University of New Mexico, Department of Mathematics & Statistics — Albuquerque, NM
Assistant Professor of Mathematics — January 2025 – present

Duke University, Department of Mathematics — Durham, NC
Adjunct Assistant Professor — January 2025 – present
Phillip Griffiths Assistant Research Professor (postdoctoral) — August 2024 – December 2024
William W. Elliott Assistant Research Professor (postdoctoral) — August 2021 – July 2024

EDUCATION

University of Utah, Salt Lake City, UT — May 2021
Ph.D., Mathematics
Thesis: Kinetic Polymerization Models and the Roles of Fibrinogen in Fibrin Gel Formation
Advisor: Aaron Fogelson

Boise State University, Boise, ID — December 2012
B.S., Applied Mathematics, *Summa Cum Laude*
Minor: Computer Science

PUBLICATIONS

7. **A. C. Nelson**, M. M. Rolls, M. V. Ciocanel, and S. A. McKinley. "Minimal mechanisms of microtubule length regulation in living cells." *Bulletin of Mathematical Biology*, 86(58), 1-33, 2024.
6. **A. C. Nelson** and A. L. Fogelson. "Towards understanding the effect of fibrinogen interactions on fibrin gel structure." *Physical Review E*, 107(2):024415, 2023.
5. A. L. Fogelson, **A. C. Nelson**, C. Zapata-Allegro, and J. P. Keener. "Development of fibrin branch structure before and after gelation." *SIAM Journal on Applied Mathematics*, 82(1), 2022.
4. **A. C. Nelson**, M. A. Kelley, L. M. Haynes, and K. Leiderman. "Mathematical models of fibrin polymerization: past, present, and future." *Current Opinion in Biomedical Engineering*, 20 (100350), 2021.
3. **A. C. Nelson**, J. P. Keener, and A. L. Fogelson. "Kinetic model of two-monomer polymerization". *Physical Review E*, 101(2), 2020.
2. J. L. Herlin, **A. C. Nelson** and M. Scheepers. "Using ciliate operations to construct chromosome phylogenies". *Involve*, 9(1), 2016.

BOOK CHAPTERS

1. A. Kent, K. Leiderman, **A. C. Nelson**, S. S. Sindi, M. M. Stadt, L. Xiong, and Y. Zhang. "Studying the effects of oral contraceptives on coagulation using a mathematical modeling approach." In *Mathematical Modeling for Women's Health: Collaborative Workshop for Women in Mathematical Biology*, pages 83–132. Springer Nature, 2024.

PREPRINTS

A. C. Nelson, S. A. McKinley, M. M. Rolls, and M. V. Ciocanel. "Emerging microtubule properties in a model of turnover and nucleation." *In review*, arXiv:2504.11466.

A. C. Nelson, E. Yao, Y. Zhang, S. Fischer-Holzhausen, C. V. Cook, L. K. Bruce, P. Dutta, S. Gholami, and A. N. Ford Versypt. "Towards Mathematical Modelling of Bone Remodelling in Surgical Menopause." *In preparation*.

H. G. Scanlon, G. Mahata, **A. C. Nelson**, S. A. McKinley, M. M. Rolls, and M. V. Ciocanel. "Feedback Mechanisms for Microtubule Regulation Lead to Biased Polarity in Neuronal Dendrites." *In preparation*.

AWARDS

Top 5% of Duke University undergraduate instructors, Trinity College Fall 2023
For at least two of of the following categories: Overall quality of course, overall quality of instructor, intellectual stimulation of course

Lewis Blake Award for Excellence in Teaching, Mathematics, Duke University 2023
Annual postdoctoral award given for excellence in teaching.

BioFire Scholar Award, Mathematics, University of Utah 2020
Annual award to one graduate student in department; includes stipend, tuition, and travel.

AWM Student Chapter Award for Scientific Excellence 2020
One of four national awards given by the Association for Women in Mathematics while as Student Chapter Vice President.

FUNDING

Seed Grant, Duke Office for Faculty Advancement February 2022 – March 2023
$14,000 award for Faculty-Student (FaSt) Math Series to build bridges and community among students and faculty. Grant aims include organizing events and programs such as book clubs, student professional development panels, faculty mentorship training, and invited speakers.

Travel grants

AIM SQuaRE Grant 2024, 2025, 2026
Travel funding for collaboration at Pasadena, CA on "Mathematical modeling and analysis to understand mechanisms of thrombosis and oral contraceptives" for three years

AMS MRC Collaboration Travel Grant 2024
$800 to travel for Mathematical Research Community collaboration

AWM Travel Grant 2023
$3500 to attend ICIAM 2023 in Tokyo, JP

NSF Research Training Grant Fellowships

DMS-2038056 (Training Tomorrow's Workforce in Analysis and Applications) 2021 – 2023
DMS-1148230 (Research Training in Mathematical and Computational Biology) 2014 – 2015

University Teaching Assistantship, Graduate College, University of Utah 2018 – 2019
Co-awarded for the mathematics Graduate Teaching Mentorship (GTM) program.

Travel awards

Duke University Arts & Science Travel Fund 2024
$1000 to attend JMM 2024 in San Francisco CA

AWM/NSF Travel Award 2023
$1500 to attend AWM Research Symposium in Atlanta GA

SIAM Early Career Travel Award 2023
$650 to attend SIAM Dynamical Systems 2023 in Portland, OR

MAA Project NExT Fellow 2021 – 2023
$5000 to attend MAA Mathfest 2022 & 2023 and JMM 2023

SIAM Student Travel Award Spring, Summer 2020
$650 to attend SIAM Annual 2020 & Life Sciences 2020 (cancelled due to COVID)

University of Utah Graduate School Travel Award Spring 2020
$500 to attend JMM 2020

INVITED & CONTRIBUTED TALKS

Building connections and community in mathematics

Math For All Conference in Clemson, SC (**Plenary**) April 2024
Equity Forum, Montana State University April 2025

Mathematical models of polymerization processes in physiology

Applied Mathematics Seminar, Montana State University April 2025
Biomath Seminar, Virginia Commonwealth University March 2024
Mathematics Colloquium, University of Cincinnati January 2024
Mathematical Biology Seminar, University of Illinois Urbana-Champaign* December 2023
Biomath Seminar Series, NC State University November 2023
Mathematical Biology Seminar, University of Pennsylvania October 2023
Mathematical Biology Seminar, Brandeis University* February 2023
Applied and Computational Mathematics Seminar, Tulane University November 2022
Applied Math Seminar, Claremont Center for Mathematical Sciences* October 2022

Modeling mechanisms of microtubule dynamics and polarity in neurons

SIAM/CAIMS Annual Meeting, Invited Minisymposium — August 2025
SMB Annual Meeting, Contributed Session — July 2025
SIAM Dynamical Systems, Invited Special Session — May 2025
AMS Spring Southeastern Sectional Meeting, Invited Special Session — March 2025
Joint Mathematics Meeting, Invited Special Session — January 2025
SIAM Annual Meeting, Invited Minisymposium — July 2024
Biology and Medicine Through Mathematics, Oral Presentation — May 2024
Joint Mathematics Meeting, Invited Special Session — January 2024
10th ICIAM, Invited Minisymposium — August 2023
MAA MathFest, Invited Paper Session — August 2023
SMB Annual Meeting, Invited Minisymposium — July 2023
SIAM Conference on Applications of Dynamical Systems, Contributed Session — May 2023
AMS Spring Central Sectional Meeting Invited Special Session — April 2023
Joint Mathematics Meeting, Invited AMS Special Session — January 2023

Towards a model of platelet aggregation and fibrin polymerization
Joint Mathematics Meeting, Invited AMS Special Session — January 2024
AWM Research Symposium, Invited Special Session — September 2023
AWM Research Symposium, Invited Special Session — June 2022

Kinetic polymerization models and the roles of fibrinogen in fibrin gel formation
Applied Mathematics Colloquium, University of North Carolina, Chapel Hill — April 2024
Mathematical Biology Seminar, University of California, Davis* — October 2021
Mathematical Biology Seminar, Duke University — September 2021
Mathematical Biology Seminar, U. of British Columbia & U. of Utah* — March 2021

Understanding the effects of fibrinogen interactions on fibrin gel structure
40th SEARCDE Conference, Contributed Session — November 2022
SIAM Conference on the Life Sciences, Special Session — July 2022
SMB Annual Meeting, Invited Minisymposium* — June 2021
SIAM Conference on the Life Sciences, Invited Special Session* — June 2020

A kinetic model of two-monomer polymerization
Joint Mathematics Meeting, AMS-AWM Special Session — January 2020
AMS Fall Western Sectional Meeting, Special Session — November 2019
Boise State University Mathematics REU Program, Boise State University — July 2019

* Remote talk

SELECT POSTER PRESENTATIONS

Triangle Computational and Applied Mathematics Symposium, Durham NC⋆ — November 2023
AWM Research Symposium Poster Session, Minneapolis MN — June 2022
AWM Graduate Student Poster Session at JMM (virtual) — January 2021
AWM Graduate Student Workshop at SIAM Annual (virtual) — July 2020
IMA Workshop for Women in Mathematical Biology, Minneapolis MN — May 2018
SACNAS Poster on Graduate Research, Salt Lake City UT — October 2017
Modeling Complex Fluids for Biological Applications, Salt Lake City UT — May 2017

⋆ Postdoc poster award winner

INVITED WORKSHOPS

ICERM, Brown University, Providence RI — January 2025
Patterns, Dynamics, and Data in Complex Systems
National Institute for Theoretical and Mathematical Biology, Chicago IL — November 2024
Random Dynamical Systems with Applications in Biology
AMS Mathematical Research Community, Java Center NY — June 2023
Complex Social Systems
Banff International Research Station, Banff AB — March 2023
Sex Differences in Physiology: Mathematical Modelling and Analysis
Collaborative Workshop for Women in Mathematical Biology, Eden Prairie MN — June 2022
Mathematical Approaches to Support Women's Health,
IMA Workshop for Women in Mathematical Biology, Minneapolis MN — May 2018

MENTORSHIP

Graduate Research

Hannah Scanlon, Duke University — Spring 2022 – present

Undergraduate Research

Carson Dudley (undergraduate thesis), Duke University — Spring 2022 – Spring 2023

Maycol Vilchez, University of Utah (with Aaron Fogelson) — Spring 2020

Undergraduate Directed Reading Program, University of Utah — Spring 2019

Chase Stolworthy, use machine learning for predictions on voting data in Utah

AWM Undergraduate Mentor — 2019 – 2024

Paired with undergraduate students to meet monthly to discuss semester, future plans, and build community at University of Utah and Duke University.

SPIRE Fellows Postdoctoral Assistant and Faculty Mentor — 2021 – 2023

Assisted in organizing monthly events. and running academic support/mentoring system for high achieving undergraduates from historically excluded backgrounds. Taught course titled "Being Human in STEM at Duke", which is a discussion-based course on identity and humanity in STEM.

TEACHING EXPERIENCE

Duke University

MATH 353/753, Ordinary and Partial Differential Equations	Fall 2024
MATH 353/753, Ordinary and Partial Differential Equations	Spring 2024
BIO 218/MATH 183, Biological Clocks: How Organisms Keep Time	Fall 2023
MATH 577, Mathematical Modeling†	Spring 2023
MATH 75, Being Human in STEM for First Year SPIRE Fellows	Spring 2023
BIO 218/MATH 183, Biological Clocks: How Organisms Keep Time	Fall 2022
MATH 75, Being Human in STEM for First Year SPIRE Fellows	Spring 2022
MATH 353/753, Ordinary and Partial Differential Equations	Spring 2022
MATH 353/753, Ordinary and Partial Differential Equations	Fall 2021

University of Utah

MATH 2250, Differential Equations and Linear Algebra♯	Spring 2019
MATH 1030, Intro to Quantitative Reasoning‡	Summer 2018
MATH 1220, Calculus II	Spring 2018
MATH 1100, Business Calculus	Fall 2017
MATH 1050, College Algebra‡	Summer 2017
MATH 1050, College Algebra	Spring 2017
MATH 1050, College Algebra	Fall 2016
MATH 1030, Intro to Quantitative Reasoning‡	Summer 2016
MATH 1030, Intro to Quantitative Reasoning	Spring 2016

† Graduate level course, ‡ Asynchronous online course, ♯ >100 students

Project NExT Fellowship — 2021 – 2023

Professional development program for early career mathematicians directed towards improving the teaching and learning of mathematics, fostering inclusivity in the mathematics community, and providing early career faculty strategies to engage in research, scholarship, and service opportunities.

Mathematics Instructor Training Facilitator, University of Utah — 2017, 2018, 2019

Facilitated annual workshop for new teaching assistants in the mathematics department. Responsibilities include organizing/planning workshops, observing new teachers, and giving lectures on teaching pedagogy.

SERVICE & OUTREACH

Service to the profession:

Secretary, Society for Mathematical Biology — November 2024 – present

Cell and Developmental Biology Subgroup

Conference session organizer

Minisymposium, SIAM Annual Meeting, Montréal, QB — August 2025

"Celebrating diversity in mathematical biology, with applications in medicine, physiology, and public health"

Special Session, SMB Annual Meeting, Edmonton AB — July 2025

"From data to mechanisms: advancement in modeling in cell and developmental biology "

Special Session, Joint Mathematics Meeting, Seattle WA — January 2025

"Diversity in Mathematical Biology"

Minisymposium, SIAM Annual Meeting, Spokane WA — July 2024
"Modeling Dynamics in Biological Systems"

Minisymposium, AWM Research Symposium, Atlanta GA — September 2023
"Promoting children's and women's health with mathematical and computational approaches"

Minisymposium, 10th ICIAM, Tokyo JP — August 2023
"Recent Advances in Modeling Complex Systems and Multiscale Problems in Mathematical Biology"

Invited Paper Session, MAA MathFest, Tampa FL — August 2023
"Recent Advances in Mathematical and Computational Biology, Highlighting Contributions from Undergraduate Researchers."

Minisymposium, SIAM Life Sciences, Pittsburgh PA — July 2022
"Mathematical Modeling of Blood Clotting and its Application"

Minisymposium, SMB Annual Meeting, Virtual — June 2021
"Mathematical Modeling of Blood Clotting: From Surface-Mediated Coagulation to Fibrin Polymerization"

Judge

TriCAMS poster Session, Chapel Hill NC — October 2024
SIAM Annual AWM Graduate Student Poster Session, Spokane WA — July 2024
JMM Undergraduate Student Poster Session, San Francisco CA — January 2024
MAA MathFest Student Poster Session, Tampa FL — August 2023
SIAM Dynamical Systems Red Sock Poster Session, Portland OR — May 2023
MAA MathFest Student Poster Session, Philadelphia PA — August 2022
JMM Undergraduate Student Poster Session, Denver CO — January 2020

Assistant, AMS Mathematical Research Communities Week 3, Java Center NY — June 2023
"Complex Social Systems"

Referee, Mathematical Biosciences, Journal of Theoretical Biology, PLOS Computational Biology

Service to the university and department:

Co-organizer, Duke Mathematical Biology Seminar — 2022 – 2025
Organization of weekly research seminar for faculty, graduate students and postdocs.

Presenter

Grad-Fac Seminar, Department of Mathematics, Duke University — October 2023
"The mathematics of bell-ringing"

Grad-Fac Seminar, Department of Mathematics, Duke University — January 2023
"Mathematical modeling of polymerization processes in physiology"

SPIRE Speaker Series, Duke University — August 2021
"Who can do math?"

Math Graduate Student Colloquium, University of Utah — October 2020
"Computing in the Natural World: *In vivo* and *in vitro*"

Math Graduate Student Colloquium, University of Utah — February 2020
"The mathematics of bell-ringing"

Organizer, Biofluids research seminar, University of Utah — 2020 – 2021
Organization of weekly research seminar for faculty, graduate students and postdocs.

Service to promote diversity, equity, and inclusivity:

Committee member, Mathematics DEI Team, Duke University — August 2022 – May 2024

Panelist, GROW (Graduate Research Opportunities for Women), Duke University — October 2022
"From day 1 to PhD"

Panelist, Society for Women in Mathematics (SWiM), Colorado School of Mines — October 2020
"Graduate school panel" (virtual)

Co-organizer, Faculty-Student Weekly Tea, FaSt Grant — February 2022 – December 2023
Department of Mathematics, Duke University

Co-organizer, Faculty-Student Math Book Club — February 2022 – May 2023
Department of Mathematics, Duke University

Co-chair, AWM Speaker series committee, Mathematics, University of Utah — 2020 – 2021
Invite and host mathematicians from underrepresented groups to give talks and network with department.

Vice President, AWM Student Chapter, University of Utah 2019 – 2020
Organize monthly student events for undergraduates and graduate students, organize outreach events on and off campus, and meet with job candidates.

COMMUNITY OUTREACH

Co-organizer, Duke Math Circles, Durham NC August 2023 – January 2025
Manage volunteers and activities for Duke Math Circles program
Volunteer, Duke Math Circles, Durham NC August 2022 – April 2024
Provide exploratory instruction for K-6 students at Central Park School for Children
Presenter, Girls Exploring Math, Duke University June 2023
"Math: We R_0 afraid to use it!"
Volunteer, Defining Your Path – Field Trip Program, University of Utah February 2020
Judge, State of Utah Sterling Scholar Award, Mathematics, Salt Lake City UT January 2020
Panelist, Clayton Middle School – Career Fair, Salt Lake City UT January 2020
Presenter, Science Day at the U., University of Utah November 2019
"Computing in Nature: Using DNA to solve math problems"
Presenter, Girls Full STEAM Ahead Camp, Leonardo Museum, Salt Lake City UT July 2016
"Math: We R_0 afraid to use it!"

WORK EXPERIENCE

Bioinformatics Summer Intern May 2019 – August 2019
Sera Prognostics, Salt Lake City, UT
Developed R scripts to remove batch and technical effects in proteomic data to aid in preterm birth prediction.

MEMBERSHIPS

American Mathematical Society
Association for Women in Mathematics
Society for Industrial and Applied Mathematics
Society of Mathematical Biology