

Anna C. Nelson

CONTACT INFORMATION

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RESEARCH INTERESTS

Applied dynamical systems, mathematical biology, polymerization, mathematical modeling

ACADEMIC APPOINTMENTS

Duke University, Department of Mathematics, Durham, NC
Phillip Griffiths Assistant Research Professor (postdoctoral) August 2024 – present
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. 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.
6. **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.
5. **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.
4. 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.
3. **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.
2. **A. C. Nelson**, J. P. Keener, and A. L. Fogelson. "Kinetic model of two-monomer polymerization". *Physical Review E*, 101(2), 2020.
1. J. L. Herlin, **A. C. Nelson** and M. Scheepers. "Using ciliate operations to construct chromosome phylogenies". *Involve*, 9(1), 2016.

PREPRINTS

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*.

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

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

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

AWARDS

Top 5% of Duke University undergraduate instructors, Trinity College Fall 2023
For at least two 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.

**INVITED &
CONTRIBUTED TALKS**

Building connections and community in mathematics
Math For All Conference in Clemson, SC (**Plenary**) April 2024

Mathematical models of polymerization processes in physiology
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 Annual Meeting, Invited Minisymposium July 2024
Biology and Medicine Through Mathematics, Oral Presentation May 2024
Joint Mathematics Meeting, AWM 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, Special Session April 2023
Joint Mathematics Meeting, AMS Special Session January 2023

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

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 SEARCD 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, 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

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 – present

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 UtahMATH 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:

Co-organizer

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

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

<i>Assistant</i> , 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:

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: <i>In vivo</i> and <i>in vitro</i> ”	
Math Graduate Student Colloquium, University of Utah	February 2020
“The mathematics of bell-ringing”	
CSME Exchange, University of Utah	November 2018
“Teacher Training & Community Building: From Graduate Student to Colleague” (joint with Kelly MacArthur, Rebecca Terry)	
Undergraduate Math Colloquium, University of Utah	April 2018
“On the rheology of cats: Are cats fluids?”	
Math Graduate Student Colloquium, University of Utah	November 2017
“On the rheology of cats: Are cats fluids?”	
Math Graduate Student Colloquium, University of Utah	September 2015
“Computing in the Natural World: <i>In vivo</i> and <i>in vitro</i> ”	
Organizer, Biofluids research seminar	2020 – 2021
Organization of weekly research seminar for faculty, graduate students and postdocs. Department of Mathematics, University of Utah	

Service to promote diversity, equity, and inclusivity:

Committee member, Mathematics DEI Team, Duke University	August 2022 – present
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 out- reach events on and off campus, and meet with job candidates.	

**COMMUNITY
OUTREACH**

Volunteer, Duke Math Circles, Durham NC	August 2022 – present
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
 Mathematical Association of America
 Society for Industrial and Applied Mathematics
 Society of Mathematical Biology