

# Anna C. Nelson

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## CONTACT INFORMATION

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## RESEARCH INTERESTS

Dynamical systems, mathematical biology, polymerization, mathematical modeling

## ACADEMIC APPOINTMENTS

**Duke University**, Durham, NC 2021 – present  
William W. Elliott Assistant Research Professor (postdoctoral position)  
Department of Mathematics  
Mentor: Maria-Veronica Ciocanel

## EDUCATION

**University of Utah**, Salt Lake City, UT May 2021  
Ph.D., Mathematics  
Advisor: Aaron Fogelson

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

## PUBLICATIONS

6. **A. C. Nelson**, M. M. Rolls, M. V. Ciocanel, and S. A. McKinley. "Minimal mechanisms of micro-tubule length regulation in living cells." *Bulletin of Mathematical Biology*, *in press*. arXiv:2310.13666.
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. Kent, K. Leiderman, **A. C. Nelson**, S. Sindi, M. M. Stadt, L. Xiong, and Y. Zhang. "Studying the effects of oral contraceptives on coagulation using a mathematical modeling approach." *Submitted*.

## AWARDS

**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**

*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

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

**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

**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 Spring 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  
\$345 to attend JMM 2020 in Denver, CO \$500 to attend JMM 2020 in Denver, CO

**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*  
Applied Mathematics Colloquium, University of North Carolina, Chapel Hill April 2024  
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*  
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  
AWM Research Symposium, Special Session June 2022

*Understanding the effects of fibrinogen interactions on fibrin gel structure*  
40th SEARCD E 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

*Kinetic polymerization models and the roles of fibrinogen in fibrin gel formation*  
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

*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

Modeling Complex Fluids for Biological Applications, Salt Lake City UT

May 2017

\* Postdoc poster award winner

**MENTORSHIP**

**SPIRE Fellows Postdoctoral Assistant and Faculty Mentor**

2021 – present

Assists in organizing and running academic support/mentoring system for high achieving undergraduates from historically excluded backgrounds. Responsibilities include organizing monthly events for fellows and teaching First Year Seminar course titled “Being Human and Flourishing in STEM,” which is a discussion-based course on identity and humanity in STEM.

**AWM Undergraduate Mentor**

Paired with undergraduate students to meet monthly to discuss semester, future plans, and build community.

University of Utah

2019 – 2021

Duke University

2021 – present

**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

**TEACHING EXPERIENCE**

**Duke University**

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<sup>†</sup>

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<sup>#</sup>

Spring 2019

MATH 1030, Intro to Quantitative Reasoning<sup>‡</sup>

Summer 2018

MATH 1220, Calculus II

Spring 2018

MATH 1100, Business Calculus

Fall 2017

MATH 1050, College Algebra<sup>‡</sup>

Summer 2017

MATH 1050, College Algebra

Spring 2017

MATH 1050, College Algebra

Fall 2016

MATH 1030, Intro to Quantitative Reasoning<sup>‡</sup>

Summer 2016

MATH 1030, Intro to Quantitative Reasoning

Spring 2016

<sup>†</sup> Graduate level course, <sup>‡</sup> Asynchronous online course, <sup>#</sup> >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*

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|---|----------------|
| Minisymposium for AWM Research Symposium, Atlanta GA  | September 2023 |
| "Promoting children's and women's health with mathematical and computational approaches"                                |                |
| Minisymposium for 10th ICIAM, Tokyo JP  | August 2023    |
| "Recent Advances in Modeling Complex Systems and Multiscale Problems in Mathematical Biology"                           |                |
| Invited Paper Session for MAA MathFest, Tampa FL  | August 2023    |
| "Recent Advances in Mathematical and Computational Biology, Highlighting Contributions from Undergraduate Researchers." |                |
| Minisymposium for SIAM Life Sciences, Pittsburgh PA   | July 2022      |
| "Mathematical Modeling of Blood Clotting and its Application"   |                |
| Minisymposium for SMB Annual Meeting, Virtual   | June 2021      |
| "Mathematical Modeling of Blood Clotting: From Surface-Mediated Coagulation to Fibrin Polymerization"                   |                |

#### *Judge*

- |   |              |
|---|--------------|
| 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"

*Presenter*, CSME Exchange, University of Utah November 2018  
"Teacher Training & Community Building: From Graduate Student to Colleague" (joint with Kelly MacArthur, Rebecca Terry)

*Panelist*, Idaho Conference on Undergraduate Research, Boise State University July 2014  
"Applying to grad school"

*Referee*, Mathematical Biosciences, Journal of Theoretical Biology

### Service to the university and department:

#### *Presenter*

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|---|----------------|
| 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"   |                |
| 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> "   |                |
| <i>Co-organizer</i> , Panel on Math Graduate School Admissions, FaSt Grant Department of Mathematics, Duke University | November 2022  |

Co-organizer, Faculty-Student Weekly Tea, FaSt Grant Department of Mathematics, Duke University	February 2022 – present
Co-organizer, Faculty-Student Math Book Club Department of Mathematics, Duke University	February 2022 – May 2023
Organizer, Biofluids research seminar Organization of weekly research seminar for faculty, graduate students and postdocs. Department of Mathematics, University of Utah	2020 – 2021
Co-chair, AWM Speaker series committee, Mathematics, University of Utah Invite and host mathematicians from underrepresented groups to give talks and network with department.	2020 – 2021
Professional Development Committee, Mathematics, University of Utah Organize monthly professional development events for grad students/postdocs	2018 – 2021
Recruitment Committee, Mathematics, University of Utah Coordinate prospective graduate student recruitment activities and schedule.	2016 – 2017
Panelist, Utah Math TA Training, University of Utah “Experienced graduate student panel”	August 2016

**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 “From day 1 to PhD”	October 2022
Student mentor, AWM Student Chapter, Duke University	2021 – 2022
Panelist, Society for Women in Mathematics (SWiM), Colorado School of Mines “Graduate school panel” (virtual)	October 2020
Vice President, AWM Student Chapter, University of Utah Organize monthly student events for undergraduates and graduate students, organize outreach events on and off campus, and meet with job candidates.	2019 – 2020

**COMMUNITY  
OUTREACH**

Volunteer, Duke Math Circles, Durham NC Provide exploratory instruction for K-6 students at Central Park School for Children	August 2022 – present
Presenter, Girls Exploring Math, Duke University “Math: We $R_0$ afraid to use it!”	June 2023
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 “Computing in Nature: Using DNA to solve math problems”	November 2019
Presenter, Girls Full STEAM Ahead Camp, Leonardo Museum, Salt Lake City UT “Math: We $R_0$ afraid to use it!”	July 2016

**WORK  
EXPERIENCE**

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

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