

# Anna C. Nelson

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## CONTACT INFORMATION

Department of Mathematics  
Duke University  
Physics 210, 120 Science Drive, Box 90320  
Durham, NC 27708

Email: [anelson@math.duke.edu](mailto:anelson@math.duke.edu)  
Website: <http://annacnelson.github.io>

## RESEARCH INTERESTS

Dynamical systems, mathematical biology, polymerization, mathematical modeling

## ACADEMIC APPOINTMENTS

**Duke University**, Department of Mathematics, Durham, NC  
William W. Elliott Assistant Research Professor (postdoctoral) August 2021 – present

## 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

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
AWM Research Symposium, Special Session	June 2022

<i>Kinetic polymerization models and the roles of fibrinogen in fibrin gel formation</i>	
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

<i>Understanding the effects of fibrinogen interactions on fibrin gel structure</i>	
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

<i>A kinetic model of two-monomer polymerization</i>	
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

<b>Graduate Research</b>	
Hannah Scanlon, Duke University	Spring 2022 – present
<b>Undergraduate Research</b>	
Carson Dudley (undergraduate thesis), Duke University	Spring 2022 – Spring 2023
Maycol Vilchez, University of Utah (with Aaron Fogelson)	Spring 2020
<b>Undergraduate Directed Reading Program, University of Utah</b>	Spring 2019
Chase Stolworthy, use machine learning for predictions on voting data in Utah	
<b>AWM Undergraduate Mentor</b>	2019 – present
Paired with undergraduate students to meet monthly to discuss semester, future plans, and build community at University of Utah and Duke University.	
<b>SPIRE Fellows Postdoctoral Assistant and Faculty Mentor</b>	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

<b>Duke University</b>	
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 <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
<b>University of Utah</b>	
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
† 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

*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:**

###### *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 outreach 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