

Alexandria Volkening

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Interests: Applied dynamical systems (emergent behavior and complex systems), agent-based and data-driven modeling, data analysis, PDEs, stochastic processes, math in biology and social science

Professional Appointments:

2021 Aug. –	Assistant Professor	Purdue University
	<ul style="list-style-type: none">• Department of Mathematics• Weldon School of Biomedical Engineering (by courtesy)	
2019 Jul. – 2021 Aug.	NSF–Simons Fellow	Northwestern University
	<ul style="list-style-type: none">• NSF–Simons Center for Quantitative Biology (CQuB)• Engineering Sciences & Applied Mathematics (ESAM)	
2017 Jun. – 2019 Jul.	Postdoctoral Fellow	Ohio State University
	<ul style="list-style-type: none">• Mathematical Biosciences Institute (MBI)	

Education:

2017 May	Ph.D., Applied Mathematics	Brown University
	<ul style="list-style-type: none">• Advisor: Björn Sandstede• Thesis: Modeling pattern formation on zebrafish	
2012 May	M.S., Applied Mathematics	Brown University
2011 May	B.S., Mathematics	UMBC
	<ul style="list-style-type: none">• <i>Summa cum laude</i>, Honors in math, Meyerhoff Scholar Affiliate	

Publications:

- [9] K Mallory, J Abrams[†], A Schwartz[†], MV Ciocanel, **A Volkening**, B Sandstede. “Influenza spread on context-specific networks lifted from interaction-based diary data”, *Royal Society Open Science*, 8(191876), 2021.
- [8] **A Volkening**, DF Linder, MA Porter, GA Rempala. “Forecasting elections using compartmental models of infection”, *SIAM Review*, 62(4):837–865, 2020.
- [7] **A Volkening**. “Linking genotype, cell behavior, and phenotype: multidisciplinary perspectives with a basis in zebrafish patterns”, *Current Opinion in Genetics and Development*, 63, 2020.
- [6] **A Volkening**, MR Abbott[†], N Chandra[†], B Dubois[†], F Lim[†], D Sexton[†], B Sandstede. “Modeling stripe formation on growing zebrafish tailfins”, *Bulletin of Mathematical Biology*, 82(56), 2020.
- [5] MR McGuirl, **A Volkening**, B Sandstede. “Topological data analysis of zebrafish patterns”, *Proceedings of the National Academy of Sciences of the USA*, 117(10), 2020.
- [4] Y Chen, J Gemmer, M Silber, **A Volkening**. “Noise-induced tipping under periodic forcing: Preferred tipping phase in a non-adiabatic forcing regime”, *Chaos*, 29(4), 2019.
- [3] **A Volkening**, B Sandstede. “Iridophores as a source of robustness in zebrafish stripes and variability in *Danio* patterns”, *Nature Communications*, 9(3231), 2018.

[†] (‡) denotes undergraduate (postbac) students mentored ***Italic*** denotes corresponding author

- [2] **A Volkening**, B Sandstede. “Modelling stripe formation in zebrafish: an agent-based approach”, *Journal of the Royal Society Interface*, 12(112), 2015.
- [1] JL Gevertz, Z Aminzare, KA Norton, J Pérez-Velázquez, **A Volkening**, KA Rejniak. “Emergence of anti-cancer drug resistance: exploring the importance of the microenvironmental niche via a spatial model”, in “Applications of Dynamical Systems in Biology and Medicine”, *IMA Volumes in Mathematics and its Applications*, 158, Springer-Verlag, A Radunskaya, T Jackson (eds.), 2015.

Expository Articles:

- HZ Brooks, Y Chen, M Feng, Y Kureh, MA Porter, **A Volkening**. “How to move a SIAM minisymposium online from the comfort of your home”, *DSWeb: The Dynamical Systems Web*, July 2020.
- **A Volkening**, B Sandstede. “How zebrafish get their stripes... or spots”, *SIAM News*, 53(2), 2020.
- **A Volkening**. “How the zebrafish got its stripes”, *The Conversation*, 17 September, 2018.

Preprints in Review:

- B Shirman[‡], **A Volkening**. “What’s math got to do with patterns in fish?”, submitted to *Frontiers for Young Minds* (intended readership: 8–11 year-olds), arXiv:2201.08692, 2021.

Select Articles in Preparation:

- “A primer on data-driven modeling of complex social systems”
- “How does student-entry time depend on lecture-hall size?” (with J Benson, M Bessonov, K Burke, S Cassani, D Cooney, MV Ciocanel)

Press Coverage & Cover Articles:

2020	Publication [8] featured as a SIAM research nugget
2020	Publication [8] described in an article in <i>Forbes</i>
2020	Publication [8] in a SIAM press release (reproduced by the California Business Journal)
2020	Publication [8] in Northwestern News (reproduced by SciTechDaily, Science Daily, others)
2020	Publication [5] highlighted in the AMS Mathematics in the Media column
2020	Publication [5] in Brown News (reproduced by Science Daily, Phys.org, others)
2019	Publication [3] recommended through the Faculty of 1000 Prime program
2018 –	Publication [3] featured as a research highlight on the NSF Math. Sciences Institutes webpage
2018	Publication [3] highlighted on the NSF Science360 website
2018	Publication [3] in Ohio State News (reproduced by ANI News, Big News Network, others)
2017	SIAM Conf. on Applications of Dyn. Systems presentation featured in the SIAM News Blog
2015	Publication [2] in Fusion News and Brown News (reproduced by Science Daily, Futurity, others)
2015	Publication [2] selected as cover image for <i>Journal of the Royal Society Interface</i> , 12(113)

Grant Applications Under Review:

- NSF–Simons: “National Institute for Theory and Mathematics in Biology: Innovation at the Crossroads of Math and Biology” (J Arciero, IUPUI, PI; J Glazier, IU Bloomington, Co-PI; D Schiavazzi, Notre Dame, Co-PI; S Schnell, Notre Dame, Co-PI; **A Volkening**, Co-PI; pre-proposal \$50,000,000, 5 years), *In review*
- NSF Mathematical Biology: “Integrating topological, data-driven, and agent-based modeling techniques to link genotype and phenotype in zebrafish” (**A Volkening**, PI, \$447,337, 3 years), *In review*

Example Student Funding, Travel, or Collaboration Grants (> 25 received):

- *AIM SQuaRE Award*
 - Collaborative project “Learning and analyzing differential equations from stochastic agent-based models” (with MV Ciocanel, K Flores, J Nardini, E Rutter, S Sindi) 2023 Feb.
- *Northwestern Undergraduate Research Assistant Program Award*
 - \$3500 to support undergraduate student research at Northwestern 2020 Oct.
 - \$3750 to support undergraduate student research at Northwestern 2020 May
- *Collaborate@ICERM Award*
 - Collaborative project “Mathematical models of pedestrian movement in large lecture halls” (with J Benson, M Bessonov, K Burke, S Cassani, D Cooney, MV Ciocanel) 2021 Jun.
- *SIAM Early Career Travel Award*
 - \$650 to participate in the SIAM Workshop on Network Science (prior to virtual transition) 2020 Jul.
 - \$650 to participate in the SIAM Conf. on Applications of Dynamical Systems 2019 May
 - \$650 to participate in the SIAM Conf. on the Life Sciences 2018 Aug.
- *AWM–NSF Travel Grant*
 - \$2300 to participate in the SIAM Conf. on Applications of Dynamical Systems 2019 May
- *Institut Mittag-Leffler Fellowship*
 - \$1526 to participate in the Mathematical Biology emphasis semester 2018 Oct.
- *US Junior Oberwolfach Fellowship*
 - \$1000 to participate in the Workshop on Diff. Eqns. arising from Organizing Principles in Bio. 2018 Sep.

Selected Awards:

- 2021 Fletcher Prize for Excellence in Research Mentorship, Northwestern University
 - Based on nominations by my undergraduate student researchers
- 2019 Finalist, Capturing the Beauty of Science: Scientific Image Contest, Northwestern University
 - Image titled “Simulating fish patterns” displayed at Evanston Township High School
- 2019 2nd Place Flash Talk, Statewide User Group Conference, Ohio Supercomputer Center
- 2017 Stella Dafermos Award, Division of Applied Mathematics, Brown University
- 2017 Graduate Speaker, Doctoral Commencement Ceremony, Brown University
- 2011 – 2015 National Science Foundation Graduate Research Fellowship
- 2011 Valedictorian, University of Maryland Baltimore County (UMBC)
- 2011 Phi Beta Kappa Honors Society
- 2011 Outstanding Senior in Mathematics, UMBC
- 2010 Outstanding Teaching Assistant in Mathematics, UMBC
- 2007 – 2011 Premier Scholarship (full tuition, room, and board), UMBC

Invited Talks:

- *On modeling or analysis of pattern formation in zebrafish*
 - BIRS Workshop: Emergent Collective Behaviors: Simulation & Experiment, Banff, Alberta 2022 May
 - Johns Hopkins University Mathematical Institute for Data Science Seminar, Baltimore, MD 2022 Apr.
 - Special session, Joint Mathematics Meetings, Cyberspace 2022 Apr.
 - Georgia Tech Mathematical Biology Seminar, Cyberspace 2022 Mar.
 - New York University Computational Biology and Medicine Colloquium, Cyberspace 2022 Mar.
 - UC San Diego Mathematics Colloquium, Cyberspace 2022 Feb.
 - Caltech Computational Mathematics + X Seminar, Cyberspace 2022 Jan.
 - BIRS Workshop: Math of the Cell, Integrating Signaling, Transport, & Mechanics, Cyberspace 2021 Oct.
 - University of Melbourne Mathematical Biology Seminar, Cyberspace 2021 Oct.

- Institute of Mathematics of Toulouse (France) Mathematical Biology Seminar, Cyberspace 2021 Sep.
- Technische Universität Dresden Mathematics Seminar, Cyberspace 2021 Apr.
- University of Kentucky Applied Mathematics Seminar, Cyberspace 2021 Apr.
- Claremont Center for the Mathematical Sciences Colloquium, Cyberspace 2021 Apr.
- Virginia Tech Mathematical Biology Seminar, Cyberspace 2021 Mar.
- University of Nottingham Mathematical Medicine and Biology Seminar, Cyberspace 2021 Mar.
- Brandeis University Special Mathematics Seminar, Cyberspace 2021 Feb.
- Northeastern University Mathematics Colloquium, Cyberspace 2021 Feb.
- Purdue University Mathematics Colloquium, Cyberspace 2021 Feb.
- University of Western Ontario Mathematics Colloquium, Cyberspace 2021 Feb.
- Dartmouth College Applied and Computational Mathematics Seminar, Cyberspace 2021 Jan.
- Tulane University Mathematics Colloquium, Cyberspace 2021 Jan.
- George Mason University Mathematics Colloquium, Cyberspace 2021 Jan.
- UC Irvine Special Mathematics Colloquium, Cyberspace 2021 Jan.
- North Carolina State University Special Mathematics Seminar, Cyberspace 2021 Jan.
- UCLA Special Applied Mathematics Seminar, Cyberspace 2020 Dec.
- University of British Columbia Mathematical Biology Seminar, Cyberspace 2020 Sep.
- Keynote, Lorentz Center Summer School: Modeling Shape & Size in Biol. Dev., Cyberspace 2020 Aug.
- Minisymposium, SIAM Conf. on the Life Sciences, Golden Grove, CA (conference postponed) 2020 Jun.
- Special Seminar, Max Planck Institute for Developmental Biology, Tübingen, Germany 2020 Jan.
- University of Notre Dame Applied Math Seminar, Notre Dame, IN 2019 Sep.
- UC Irvine Special Math Colloquium/Biophysics & Systems Biology Seminar, Irvine, CA 2019 Feb.
- University of North Carolina at Chapel Hill Special Seminar, Chapel Hill, NC 2019 Feb.
- Boston University Dynamical Systems Seminar, Boston, MA 2019 Jan.
- Special seminar, NSF–Simons Center for Quantitative Biology, Evanston, IL 2019 Jan.
- New Frontiers in Pattern Formation Workshop, Cardiff, UK (virtual) 2018 Dec.
- Special Seminar, Max Planck Institute for Developmental Biology, Tübingen, Germany 2018 Oct.
- Leiden University Informal Analysis Seminar, Leiden, Netherlands 2018 Oct.
- 1010 Workshop on Mathematical Biology, Instiut Mittag-Leffler, Djursholm, Sweden 2018 Oct.
- Minisymposium, SIAM Conf. on the Life Sciences, Minneapolis, MN 2018 Aug.
- Minisymposium, European Conf. on Mathematical & Theoretical Biology, Lisbon, Portugal 2018 Jul.
- University of Bath Centre for Mathematical Biology Seminar, Bath, UK 2018 Feb.
- Group Meeting, University of Oxford Wolfson Centre for Math Biology, Oxford, UK 2018 Feb.
- University of Surrey Mathematics of Life & Social Sciences Seminar, Surrey, UK 2018 Feb.
- Minisymposium, SIAM Conf. on Analysis of PDEs, Baltimore, MD 2017 Dec.
- College of Wooster Bio/Physics Colloquium, Wooster, OH 2017 Oct.
- Minisymposium, SIAM Conf. on Applications of Dynamical Systems, Snowbird, UT 2017 May
- MIT Numerical Methods for PDEs Seminar, Cambridge, MA 2017 Mar.
- Seminar, Harvard School of Engineering & Applied Sciences, Cambridge, MA 2017 Jan.
- Penn State Theoretical Biology Seminar, State College, PA 2016 Nov.
- Minisymposium, SIAM Conf. on Nonlinear Waves & Coherent Structures, Philadelphia, PA 2016 Aug.
- Minisymposium, SIAM Conf. on the Life Sciences, Boston, MA 2016 Jul.
- Minisymposium, SIAM Annual Meeting, Boston, MA 2016 Jul.
- Minisymposium, SIAM Conf. on Analysis of PDEs, Scottsdale, AZ 2015 Dec.
- Minisymposium, SIAM Conf. on Applications of Dynamical Systems, Snowbird, UT 2015 May
- Special Seminar, Max Planck Institute for Developmental Biology, Tübingen, Germany 2015 Apr.
- Minisymposium, SIAM Conf. on Nonlinear Waves & Coherent Structures, Cambridge, UK 2014 Aug.
- *On topological techniques for quantifying zebrafish and other cell-based patterns*
 - ICERM Workshop on Geometric and Topological Methods in Data Science, Cyberspace 2021 Dec.

- POSTECH (Korea) MINDS Seminar, Cyberspace 2021 Nov.
- Special session, AMS Fall Southeastern Sectional Meeting, Cyberspace 2021 Nov.
- Mathematical Biosciences Institute REU Seminar Series, Cyberspace 2021 Jun.
- Minisymposium, Society for Mathematical Biology Annual Meeting, Cyberspace 2021 Jun.
- Minisymposium, SIAM Conf. on Applications of Dynamical Systems, Cyberspace 2021 May
- University of Birmingham Applied Mathematics Seminar, Cyberspace 2021 Mar.
- Special session, Joint Mathematics Meetings, Cyberspace 2021 Jan.
- Southeast Center for Mathematics and Biology Annual Symposium, Cyberspace 2020 Dec.
- University of Pennsylvania Mathematical Biology Seminar, Cyberspace 2020 Oct.
- Duke University Mathematical Biology Seminar, Cyberspace 2020 Sep.
- Minisymposium, SMB/ESMTB Annual Meeting, Cyberspace 2020 Aug.
- Minisymposium, SIAM/CAIMS Annual Meeting, Cyberspace 2020 Jul.
- Mathematical Biosciences Institute REU Seminar Series, Cyberspace 2020 Jun.
- Minisymposium, SIAM Conf. on Mathematics of Data Science, Cyberspace 2020 May
- Ohio State University Applied Math Seminar, Columbus, OH 2020 Jan.
- BIRS Workshop: Bridging Cell. & Tissue Dyn. from Normal Dev. to Cancer, Banff, Alberta¹ 2019 Jun.
- *On election forecasting with compartmental models*
 - PIMS/University of British Columbia Rising Stars Colloquium, Cyberspace 2020 Oct.
 - UC Davis Mathematical Biology Seminar, Cyberspace 2020 Oct.
 - Williams College Data Science Bootcamp, Cyberspace 2020 Jan.
 - University of Minnesota Dynamical Systems Seminar, Minneapolis, MN 2019 Oct.
 - Minisymposium, SIAM Conf. on Applications of Dynamical Systems, Snowbird, UT 2019 May
 - Case Western Reserve University Applied Math Seminar, Cleveland, OH 2019 Mar.
 - MBI Workshop on Modeling & Analysis of Dynamic Social Networks, Columbus, OH 2018 Oct.
 - Seminar, Ohio Wesleyan University, Delaware, OH 2018 Sep.
- *On zebrafish patterns, with a focus on modeling and public-science outreach*
 - UC Riverside Interdisc. Center for Quant. Modeling in Biology/AWM Seminar, Cyberspace 2020 Nov.
- *On modeling self-organization*
 - MBI Workshop on Mathematical & Computational Methods in Biology, Cyberspace² 2020 May
 - Special session, Joint Mathematics Meetings, Baltimore, MD 2019 Jan.
 - Ohio Wesleyan University Science Lecture Series, Delaware, OH 2018 Sep.
- *On other topics in mathematical biology*
 - BIRS Workshop: Mathematics of the Cell, Banff, Alberta 2018 Aug.
 - Special session, AMS Spring Central Sectional Meeting, Columbus, OH 2018 Mar.

Other Local Seminar Talks:

- *At Purdue University*
 - Purdue University Bridge-to-Research Seminar, West Lafayette, IN 2022 Feb.
 - Purdue University Comparative Pathobiology Seminar, West Lafayette, IN 2021 Dec.
 - Purdue University PDE & Analysis Seminar, West Lafayette, IN 2021 Dec.
 - Purdue University Computational & Applied Math Seminar, West Lafayette, IN 2021 Sep.
 - Purdue University Bridge-to-Research Seminar, West Lafayette, IN 2021 Sep.
 - Purdue University Biomedical Engineering Seminar, West Lafayette, IN 2021 Aug.
- *Prior to Purdue University*
 - **22** additional local talks while at Northwestern, Ohio State, or Brown (e.g., the OSU TDAI Computational Social Sciences Brown Bag Series, the OSU/MBI Data Analytics Seminar, and the Brown–BU PDE Seminar)

¹Recording: <http://www.birs.ca/events/2019/5-day-workshops/19w5080/videos/watch/201906190901-Volkening.html>

²Recording: <https://video.mbi.ohio-state.edu/video/player/?id=4909>

Contributed & Workshop Talks:

- 2021 Jun. Workshop on Mathematical and Computational Biology, Cyberspace
- 2020 Dec. New Math at the Interface Workshop (CQuB Conf. on Quant. Approaches in Biology), Cyberspace
- 2020 Jul. SIAM Workshop on Network Science, Cyberspace
- 2019 Oct. CMCF Annual Symposium on Multiscale Cell Fate, Irvine, CA
- 2019 Jul. Society for Mathematical Biology Annual Meeting, Montreal Québec
- 2019 Apr. Rising Stars Workshop for Women in Computational & Data Sciences, Austin, TX
- 2019 Jan. Joint Mathematics Meetings, Baltimore, MD
- 2017 Jul. SIAM Annual Meeting, Pittsburgh
- 2017 Mar. WINRS New England Meeting, Providence, RI
- 2017 Jan. Dynamics Days (flash talk), Silver Spring, MD
- 2016 Apr. RPI Applied Math Days, Troy, NY
- 2015 Jul. Pattern Formation Workshop, Halifax, Canada

Posters:

- 2020 Jul. Society for Developmental Biology Annual Meeting, Cyberspace
- 2019 Oct. CMCF Annual Symposium on Multiscale Cell Fate, Irvine, CA
- 2019 Sep. CQuB Conference on Quantitative Approaches in Biology, Evanston, IL
- 2019 Jun. MBI Summit on the Rules of Life, Columbus, OH
- 2019 Jun. BIRS Workshop: Bridging Cell. & Tissue Dyn. from Normal Dev. to Cancer, Banff, Alberta
- 2019 Apr. Rising Stars Workshop for Women in Computational & Data Sciences, Austin, TX
- 2019 Jan. Dynamics Days, Evanston, IL
- 2018 Aug. BIRS Workshop: Mathematics of the Cell, Banff, Alberta
- 2018 Jul. European Conf. on Mathematical & Theoretical Biology, Lisbon, Portugal
- 2018 Apr. MBI Emphasis Workshop on Multiscale Dynamics of Infection, Columbus, OH
- 2018 Apr. OSU College of Public Health Research Showcase, Columbus, OH
- 2018 Mar. MBI Emphasis Workshop on Socioepidemiology, Columbus, OH
- 2017 Dec. SIAM Conf. on Analysis of PDEs, Baltimore, MD
- 2017 Aug. ICERM Workshop on Pedestrian Dynamics, Providence, RI
- 2017 Jan. Dynamics Days, Silver Spring, MD
- 2016 Jun. Conference on Analysis of PDEs using Dynamical Systems Techniques, Boston, MA
- 2016 Jan. Opening Workshop: Isaac Newton Institute Programme on Stoch. Dyn. Systems, Cambridge, UK
- 2014 May Stability of Solitary Waves, Centro di Ricerca Matematica Ennio De Giorgi, Pisa, Italy

University Talks:

- 2017 May Doctoral Commencement Address, Brown University, Providence, RI
- 2011 May Valedictorian Address, UMBC, Baltimore, MD

Teaching Experience:

- *Instructor of Record*
 - Topics in Mathematics for Undergraduates (research course, $\times 2$), Purdue University 2022 Spring
 - Ordinary Differential Equations (MA 26600), Purdue University 2021 Fall, 2022 Spring
 - Teaching evaluation (2021 Fall): 4.66/5
 - Projects Special (research course), Northwestern University 2020 Spring, Fall
 - Linear Algebra & Differential Equations for Engineers, Ohio State University 2019 Spring
 - Teaching evaluation: 4.46/5
- *Instructor*

- NSF–Simons Center Workshop: Intro to Building Models, Northwestern University 2020 Jul.
— Co-developed and instructed a 2-day virtual workshop on building models for an interdisciplinary, biological audience (PhD level)³
- Multivariable Calculus, Catalyst Summer Bridge Program, Brown University 2015 Summ.
— Designed and led a week-long math curriculum for incoming freshmen
- *Project Mentor/Discussion Leader*
 - Modeling Shape & Size in Biological Development (PhD level), Lorentz Center 2020 Aug.
 - Health & Science Reporting (Medil journalism class), Northwestern University 2020 Feb.
 - Calculus for the Life Sciences, Ohio State University 2017, 2018 Nov.
- *Guest Lecturer*
 - Mathematics of Democracy, Harvey Mudd College 2021 Fall
 - Methods of Applied Mathematics II, Brown University 2021 Summ.
 - Special Topics: Modeling Social Systems, Northwestern University 2020 Spring
 - Probability and Statistics,, Ohio State University 2019 Spring
 - Foundations of Higher Mathematics, Ohio State University 2019 Spring
 - Beginning Scientific Computing, Ohio State University 2019 Spring
 - Methods of Applied Mathematics I, Brown University 2013 Fall
- *Co-Instructor*
 - Business Mathematics, Community College of RI in correctional facilities 2014 Spring
 - Basic College Math, Community College of RI program in correctional facilities 2013 Fall
- *Teaching Assistant*
 - Methods of Applied Mathematics I (ODEs), Brown University 2013 Spring, 2013 Fall
 - Honors Calculus I, UMBC 2009 Fall, 2010 Fall
- *Grader*
 - Real Analysis II, UMBC 2011 Spring

Postbac Student Research Supervision (1 student):

- *Implementing a zebrafish cellular automaton model online* 2020 Jan. – Sep.
 - Blake Shirman (Current: MS Student, Mathematics, DePaul University)

Undergraduate Student Research Supervision (> 25 students):

- *Software to make images of simulated zebrafish patterns look more realistic*
 - Caroline Henson (Purdue University 2025) 2022 Jan. –
 - Abhiram Nambiar (Purdue University 2025) 2022 Jan. –
- *Forecasting U.S. elections with compartmental models*
 - Manas Paranjape (Purdue University 2025) 2022 Feb. –
 - Ryan Branstetter (Purdue University 2023) 2022 Jan. –
 - William He (Northwestern University 2023) 2020 Apr. – Dec.
 - Christopher Lee (Northwestern University 2023) 2020 Apr. – 2021 Apr.
 - Samuel Chian (Northwestern University 2023) 2020 Jun. – Dec.
— Christopher and Will received the Audience Choice award for their virtual poster video at the 2020 NU Undergraduate Research & Arts Expo.
- *Mathematical methods to analyze state–state relationships* 2020, 2021 Summ.
 - Brian Hsu (Northwestern University 2021)
— Brian received an NU Undergraduate Research Grant and was selected as a finalist for the Fletcher URG Prize for outstanding summer research.

³Lecture: <https://northwestern.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=7d04a874-a292-4ff2-bd66-ac2500daeea1>
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- *Investigating the accuracy of election forecasts in time* 2021 Jan. – May
 - Emily Mansell (Northwestern University 2023)
- *Machine-learning methods to extract pigment cells from fish-pattern images* 2021 Jan. – May
 - Harita Duggirala (Northwestern University 2024)
- *Image-processing methods for measuring pigment cells in zebrafish patterns* 2020 Summ.
 - Olivia Dunne (University of Chicago 2022)
- *Analyzing patterns in a cellular automaton model using TDA* (with B Sandstede) 2020 Summ.
 - Nathan Elbaum (Brown University 2021)
 - Samuel Maffa (Brown University 2022)
- *Modeling stripe formation across the body and fins of zebrafish* (with B Sandstede) 2019 Summ.
 - Addie Harrison (Current: PhD Student, Mathematics, University of Arizona)
 - Gisela Hoxha (Brown University 2021)
 - Gil Parnon (Current: PhD Student, Mathematics, Oregon State University)
 - Gil was selected as a finalist for the 2019 NSF–Simons Center Prize for Undergraduate Research in Quantitative Biology.
 - Madison Russell (Current: PhD Student, Mathematics, University at Buffalo)
 - Berke Türkay (Brown University 2021)
- *Modeling stripe formation on the tailfins of zebrafish* (with B Sandstede) 2016 Summ.
 - Madeline Abbott (Current: MS Student, Biostatistics, University of Michigan)
 - Neil Chandra (Current: Software Engineer, Facebook)
 - Bethany Dubois (Current: Scientific Associate, D.E. Shaw Research)
 - Francesca Lim (Current: Data Science Intern, Citizens Bank)
 - Dorothy Sexton (Current: Economic Analyst Intern, Emsi)
- *Stability analysis of agent-based models using PDMPs* (with MV Ciocanel, B Sandstede) 2016 Summ.
 - Cassandra Cole (Brown University 2018)
 - Philip Doldo (Current: PhD Student, Applied Mathematics, Cornell University)
 - Claire Qing Fan (Current: PhD Student, Public Policy, University of Chicago)
 - Claire, Cassie and Philip received an Outstanding Poster Award for their research at the JMM Undergraduate Poster Session in 2017 Jan.
- *Independent study on zebrafish fins* (with B Sandstede) 2015 Fall
 - Emily Briggs (Brown University)
- *Network construction from diary-based data* (with MV Ciocanel, B Sandstede) 2015 Summ.
 - Joshua Rubin Abrams (Current: PhD Student, Mathematics, University of Arizona)
 - Anne Schwartz (Current: Software Development Engineer, Amazon)

Education/Mentoring Training:

- 2018 Diversity and Implicit Bias Awareness Certificate, Ohio State University
- 2014 – 2016 Sheridan Center Certificate V: Academic Advising Track, Brown University
- 2014 – 2015 TEAM Collective (advice for advisors of underrepresented students), Brown University

Service (Field):

- *Workshop Co-organizer* (≈ 40 participants each)
 - AMS Math Research Community: Mathematics of Complex Social Systems (with HZ Brooks, M Feng, MA Porter) In review
 - BIRS Workshop: Building Networks: Women in Complex & Nonlinear Systems (with HZ Brooks, NH Fefferman, N Rodríguez) 2022 Sep.
 - AMS Math Research Community: Agent-Based Modeling in Biological & Social Systems 2018 Jun.

- (with AJ Bernoff, MR D’Orsogna, AE Lindsay, C Topaz, L Ziegelmeier)
- Workshop on Agent-Based Modeling, Brown University (with MV Ciocanel, J Gemmer) 2015 Mar.
- *Short-course Lead-organizer* (over 300 participants)
- AMS Short Course: Mathematical & Computational Methods for Complex Social Systems, prior to the Joint Mathematics Meetings (with HZ Brooks, M Feng, MA Porter) 2021 Jan.
- *Conference Organizing Committee Member*
- SIAM Conference on Applications of Dynamical Systems 2023 May
- *Committee Chair*
- AWM Travel Grant Selection Committee 2022 Feb. –
- *Minisymposium Organizer/Co-organizer*
- “Combining topological, data-driven, and modeling perspectives for complex biological systems”, SIAM Conf. on the Life Sciences (with MV Ciocanel and J Nardini) In review
- “Mathematics of complex systems”, Joint Mathematics Meetings (with HZ Brooks, AP Hoover, MA Porter, and AC Schwarze) 2022 Apr.
- “Mathematics of complex systems in biology”, AMS Spring Central Sect. Meeting (with N Wei) 2022 Mar.
- “Modeling opinion dynamics in complex social systems”, SIAM Conf. on Applications of Dynamical Systems (with JD Johnson) 2021 May
- “Agent-based dynamics and self-organization in biology”, Joint Mathematics Meetings (with AJ Bernoff, J Weinburd) 2021 Jan.
- “Data-driven methods and modeling with applications to health science”, virtual SIAM Conf. on Mathematics of Data Science (with Y Chen) 2020 May
- “Dynamics of democracy”, SIAM Conf. on Applications of Dynamical Systems (with HZ Brooks) 2019 May
- “Agent-based modeling in the life sciences”, SIAM Conf. on the Life Sciences (with AJ Bernoff, MR D’Orsogna, AE Lindsay) 2018 Aug.
- “Analytical & computational advances in mathematical biology across scales”, AMS Spring Central Sectional Meeting (with MV Ciocanel) 2018 Mar.
- “PDEs arising from the self-organization of agents”, SIAM Conf. on Analysis of PDEs 2017 Dec.
- “Stripe formation on zebrafish: a collection of biological & mathematical perspectives”, SIAM Conf. on the Life Sciences 2016 Jul.
- “Differential equations, probability, and sea ice”, Joint Mathematics Meetings (with BC Barry, K Hill, R Lieb-Lappen, C Sampson) 2016 Jan.
- “The behavior of autonomous agents in diverse applications”, SIAM Conf. on Applications of Dynamical Systems (with P Carter) 2015 May
- *Conference Mentorship/Community-Building Session Co-organizer*
- “Mentoring session”, SIAM Conf. on Applications of Dynamical Systems (with K Burke, C Postlethwaite, M Silber) 2021 May
- “Student & postdoc icebreaker”, SIAM Conf. on Applications of Dynamical Systems (with HZ Brooks) 2019 May
- *Panelist*
- Panel on Careers in Academia, SAMSI Workshop on Data-Driven Math. & Stat. Modeling 2021 Jul.
- *Poster Session Judge*
- ePoster Session, SMB Annual Meeting 2021 Jun.
- Methods for Biological Modeling ePoster Session, SMB Annual Meeting 2020 Aug.
- Red Sock Award Poster Sessions, SIAM Conf. on Applications of Dynamical Systems 2019 May
- MAA Undergraduate Student Poster Session, Joint Mathematics Meetings 2019 Jan.
- *Reviewer*
- Banff International Research Station Workshop proposal

- *Referee*
 - SIAM Journal on Applied Dynamical Systems ◦ Science
 - SIAM Journal on Applied Mathematics ◦ PNAS
 - Journal of Mathematical Biology ◦ Science Advances
 - Discrete & Continuous Dyn. Systems B ◦ MN Journal of Undergraduate Math.
 - Mathematical Biosciences ◦ Zebrafish
 - IMA Journal of Applied Mathematics ◦ Symmetry
 - PLOS One ◦ PLOS Computational Biology
 - Physica A ◦ Cells & Development
 - Royal Society Open Science
- *Mentor*
 - National Math Alliance pre-doctoral mentoring program 2021 Nov. –
 - Society of Hispanic Prof. Engineers National Conference writing-review program (1 student) 2021 Nov.
 - Society for Mathematical Biology Annual Meeting mentoring program (1 student) 2021 Jun.
 - SACNAS National Diversity in STEM mentoring program (2 students) 2020 Oct.
 - Society for Mathematical Biology Annual Meeting mentoring program (2 students) 2020 Aug.
 - European Conf. on Mathematical & Theoretical Biology mentoring program (2 students) 2018 Jul.
- *Media Co-Chair*
 - Methods for Biological Modeling Subgroup, Society for Mathematical Biology 2020 Aug. –
- *Session Chair*
 - Virtual MBI Workshop on Mathematical & Computational Methods in Biology 2020 May

Service (University):

- *Committee Member*
 - NSF–Simons Center for Quant. Biology Leadership Council, Northwestern University 2019 – 2021
 - Honorary Degree Committee, Brown University 2015 – 2017
 - Department of Public Safety Oversight Committee, Brown University 2015 – 2017
 - Graduate Student Council Finance Board, Brown University 2015 – 2016
 - Graduate Student Council (representative for applied mathematics), Brown University 2014 – 2016
 - Promotion and Tenure Committee (undergraduate student representative), UMBC 2008, 2010
- *Judge/Reviewer*
 - Undergraduate Research and Arts Exposition (virtual posters), Northwestern University 2020 May
 - Hayes Graduate Research Forum (abstracts), Ohio State University 2018 Dec.
 - PDA Travel Award Applications, Ohio State University 2018 Dec.
 - Denman Undergraduate Research Forum (posters), Ohio State University 2018 Apr.
 - Natural & Math. Sciences Undergraduate Research Forum (posters), Ohio State University 2018 Mar.
 - Hack Ohi/o Hackathon (projects), Ohio State University 2017 Oct.
 - Undergraduate Research Fall Forum (posters), Ohio State University 2017 Sep.
- *Academic Advisor*
 - Primary Faculty Academic Advisor (4 students), Brown University 2014 – 2016

Service (Department):

- *Speaker*
 - Mathematics Society Faculty Talk (undergraduate math club), Purdue University 2022 Mar.
 - Basic Skills Workshop (presentation on building an online presence), Purdue University 2021 Oct.
 - Quant. Biology Dialogue, Summer Undergraduate Research Program, Northwestern 2020 Aug.
 - Science on Social Media, Summer Undergraduate Research Program, Northwestern 2020, 2021 Jul.

- L^AT_EX Tutorial, MBI Mathematical Biosciences Bootcamp, Ohio State University 2019 Jun.
- Math Biology Group, Applied Math Graduate Student Retreat, Brown University 2016 Sep.
- *Organizer/Co-organizer*
 - CQuB Panel: Applying for Postdoc & Tenure-Track Positions, Northwestern University 2021 Apr.
 - ESAM Departmental Social Game Hour (virtual), Northwestern University 2020 Spring, Fall
 - Postdoc Panel, Brown University 2015 May
 - Alumni Panel: Jobs in Academia & Industry, Brown University 2015 Sep.
 - Multiple events for the Rose Whelan Society for Women in Math, Brown University 2013 – 2017
 - Bi-annual final exam prep sessions for applied math courses, Brown University 2013 – 2016
- *Judge/Reviewer*
 - NSF–Simons Center for Quant. Biology Pilot Projects, Northwestern University 2020, 2021 Spring
 - Undergraduate Poster Session, NSF–Simons Conference on Quant. Approaches in Biology 2020 Nov.
 - Mathematical Contest for Modeling, Ohio State University 2017 – 2019
 - Brown Mathematical Contest for Modeling, Brown University 2015, 2016
- *Mentor*
 - Applied Math Grad–Undergrad Mentoring Program (4 students), Brown University 2016 – 2017
- *Panelist*
 - Career Path Panel, MBI Mathematical Biosciences Bootcamp, Ohio State University 2019 Jun.
 - MBI Panel for Sampling Advanced Math for Minority Students, Ohio State University 2017 Jul.
 - Panel on REUs, AWM, Brown University 2016 Oct.
 - Graduate School Panel, AWM & Rose Whelan Society, Brown University 2016 Mar.
- *President & Lead Founder*
 - SIAM Student Chapter, Brown University 2015 – 2016
 - Co-organized 10 events and grew chapter to over 100 members spanning 8 disciplines
- *Secretary*
 - SIAM Student Chapter, Brown University 2016 – 2017
 - AWM Student Chapter, Brown University 2013 – 2014

Outreach (Math-Engagement & Public-Science Talks):

- *On zebrafish patterns and math biology (for a high-school audience)*
 - California State Summer School For Math & Science at UC Davis, Cyberspace 2021 Jul.
- *On election forecasting and my scientific story*
 - Interview in the 2Scientists podcast⁴ 2020 Oct.
- *On U.S. election forecasting and complex systems*
 - Levy Senior Citizen Center, Cyberspace 2020 Oct.
- *On zebrafish patterns and applied math (for an elementary-school audience)*
 - Washington Elementary School (3rd grade computer-coding class), Evanston, IL 2020 Feb.
 - Washington Elementary School (2nd grade computer-coding class), Evanston, IL 2020 Feb.
 - Pheasant Run Boys & Girls Club (after school program), Reynoldsburg, OH 2018 Dec.
 - Gables Elementary School (Boys & Girls Club summer program), Columbus, OH 2018 Jul.
 - Oakmont Elementary School (Boys & Girls Club summer program), Columbus, OH 2018 Jul.
 - Livingston Elementary School (Boys & Girls Club summer program), Columbus, OH 2018 Jul.
- *On stability analysis (for an elementary- or middle-school audience)*
 - JHU Center for Talented Youth program, Providence, RI 2016 Dec.
 - Jewish Community Day School (5th grade class), Providence, RI 2016 Feb.
- *On intracellular transport and random walks (for a high-school audience)*

⁴Preliminary recording: <https://www.youtube.com/watch?v=V8UW3uGrdiU>

- Young Women’s Summer Institute (students and teachers), Columbus, OH 2018 Jul.
- *On fish patterns and self-organization*
 - Levy Senior Citizen Center, Evanston, IL 2019 Dec.
 - STEAM Factory, Columbus, OH 2018 Mar.

Other Outreach:

- *Judge*
 - AWM Essay Contest: Biographies of Contemporary Women in Mathematics 2016 – 2018, 2020
 - Ohio Supercomputer Center SUG Conference (posters), Columbus, OH 2019 Apr.
 - High School I/O Hackathon (projects), Columbus, OH 2019 Mar.
- *Interviewee*
 - AWM Essay Contest: Biographies of Contemporary Women in Math (college category) 2020 Jan.
- *Exhibit Presenter*
 - Evanston Twp. High School, Scientific Image & Student Art Exhibit, Evanston, IL 2019 Dec.
- *Panelist/Speaker*
 - AWM mentoring program at Wake Forest University, Cyberspace 2020 Oct.
 - K–12 classrooms (2 classes), SkypeAScientist Outreach Program, Cyberspace 2019 Oct.
 - Young Women’s Summer Institute Career Night (6th–7th grade girls), Columbus, OH 2018 Jul.
- *Group Leader/Mentor/Volunteer*
 - Expanding Your Horizons Conference (6th–8th grade girls), Evanston, IL 2019 Dec.
 - Metro High School Coding Club, Columbus, OH 2018 Sep.
 - Johnnycake Elementary School, Baltimore, MD 2008 – 2009
- *Member*
 - 500 Women Scientists Gage directory 2020 –
 - STEAM Factory, Ohio State University 2018 – 2019
 - Math CoOp Outreach Program (founding member), Brown University 2014 – 2017
 - NSF Graduate Research Fellowship Program Experienced Resource Person List 2011 –

Invited Workshop Participation:

- 2022 Apr. Simons Foundation MathBioSys Annual Meeting, Cyberspace
- 2021 Dec. ICERM Workshop on Geometric and Topological Methods in Data Science, Cyberspace
- 2021 Oct. BIRS Math of the Cell Workshop: Integrating Signaling, Transport, & Mechanics, Cyberspace
- 2021 Oct. Broadening Participation: 2021 MPS Workshop for Young Investigators, Cyberspace
- 2020 May MBI Workshop on Mathematical & Computational Methods in Biology, Cyberspace
- 2019 Aug. ICERM Workshop on Applied Math. Modeling with Topological Techniques, Providence, RI
- 2019 Jun. BIRS Worksop on Bridging Cell. & Tissue Dyn. from Normal Dev. to Cancer, Banff, Alberta
- 2019 May NIMBioS/DySoC Investigative Workshop: Mathematics of Gun Violence, Knoxville, TN
- 2019 Apr. Rising Stars Workshop for Women in Computational & Data Science, Austin, TX
- 2018 Oct. Program on Mathematical Biology, Institut Mittag-Leffler, Djursholm, Sweden
- 2018 Sep. Workshop on Diff. Eqns. arising from Organizing Principles in Biology, Oberwolfach, Germany
- 2018 Aug. BIRS Math of the Cell Workshop: Mech. & Chem. Signaling across Scales, Banff, Alberta
- 2017 Aug. ICERM Workshop on Pedestrian Dynamics, Providence, RI
- 2015 Jun. AMS Math Research Community on Sea Ice, Diff. Equations, & Probability, Snowbird, UT
- 2013 Sep. IMA Research Collaboration for Women in Applied Math & Dyn. Systems, Minneapolis, MN

Tech. Skills: MATLAB, HTML, CSS, AUTO (numerical continuation)

Memberships:

- Society for Industrial & Applied Mathematics (SIAM)
- Association for Women in Mathematics (AWM)
- American Mathematical Society (AMS)
- Society for Advancement of Chicanos/Hispanics & Native Americans in Science (SACNAS)
- Society for Mathematical Biology (SMB)
- National Association of Mathematicians (NAM)
- Society for Developmental Biology (SDB)
- American Physical Society (APS)
- Society for Political Methodology (SPM)