Daniel B. Cooney

Department of Mathematics
University of Illinois Urbana-Champaign
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RESEARCH INTERESTS

Mathematical Interests: Dynamical Systems, Applied PDEs, Network and Graphon Modeling
Biological Interests: Theoretical Ecology, Evolutionary Dynamics, Evolutionary Game Theory, Multilevel Selection, Collective Behavior, Pattern Formation

ACADEMIC APPOINTMENTS

Assistant Professor, Department of Mathematics — August 2023 to Present
University of Illinois Urbana-Champaign, Urbana, IL, USA
Affiliate, Carl R. Woese Institute for Genomic Biology

Affiliate Member, National Institute for Theory and Mathematics in Biology — February 2025 to Present
Northwestern University and the University of Chicago, Chicago, IL, USA

Simons Postdoctoral Fellow, Center for Mathematical Biology — August 2020 to August 2023
University of Pennsylvania, Philadelphia, PA, USA
Departments of Mathematics and Biology
Postdoctoral Mentors: Yoichiro Mori and Joshua Plotkin

EDUCATION

Ph.D., Applied and Computational Mathematics — September 2015 to June 2020
Princeton University, Princeton, NJ, USA
Advisor: Simon A. Levin
Dissertation: "PDE Models for Multilevel Selection: The Evolution of Cooperation and the Shadow of Lower-Level Selection"
M.A. awarded in September 2017

A.B., Cum Laude in Mathematics — August 2010 to May 2014
Harvard University, Cambridge, MA, USA
Concentration in Mathematics with Secondary Field in Economics
Senior Thesis: "Rock-Paper-Scissors: An Application of Evolutionary Game Theory to Electoral Politics," advised by Clifford H. Taubes

PUBLICATIONS

14. T. Yao*, C. Xu*, & **D.B. Cooney** (2025). Pattern Formation in Agent-Based and PDE Models for Evolutionary Games with Payoff-Driven Motion. *arXiv preprint arXiv:2509.20538* (in press, *Bulletin of Mathematical Biology*). (* joint first authors)
13. K. Alexiou & **D.B. Cooney** (2025). Steady-State and Dynamical Behavior of a PDE Model of Multilevel Selection with Pairwise Group-Level Competition. *Bulletin of Mathematical Biology*, *87(97)*: 1-72.

12. **D.B. Cooney**(2025). Exploring the evolution of altruistic punishment with a PDE model of cultural multilevel selection. *Bulletin of Mathematical Biology*, *87(51)*:1-99.
11. **D.B. Cooney**, S.A. Levin, Y. Mori, & J.B. Plotkin (2023). Evolutionary Dynamics Within and Among Competing Groups. *Proceedings of the National Academy of Sciences USA*, *120(20)*:e2216186120.
10. J. Benson, M. Bessonov, K. Burke, S. Cassani, M.V. Ciocanel, **D.B. Cooney**, & A. Volkening (2023). How do classroom-turnover times depend on lecture-hall size? *Mathematical Biosciences and Engineering*, *20(5)*:9179-9207.
9. **D.B. Cooney***, D.H. Morris*, S.A. Levin, D.I. Rubenstein, & P. Romanczuk (2022). Social Dilemmas of Sociality due to Beneficial and Costly Contagion. *PLoS Computational Biology*, *18(11)*: e1010670. (* joint first authors)
8. **D.B. Cooney** (2022). Assortment and Reciprocity Mechanisms for Promotion of Cooperation in a Model of Multilevel Selection. *Bulletin of Mathematical Biology*, *84(11)*, 1-49.
7. **D.B. Cooney**, F.W. Rossine, D.H. Morris, & S.A. Levin (2022). A PDE Model for Protocell Evolution and the Origin of Chromosomes via Multilevel Selection. *Bulletin of Mathematical Biology*, *84(10)*, 1-90.
6. **D.B. Cooney** & Y. Mori (2022). Long-Time Behavior of a PDE Replicator Equation for Multilevel Selection in Group-Structured Populations. *Journal of Mathematical Biology*, *85(2)*, 1-67.
5. R. Carmona, **D.B. Cooney**, C.V. Graves, & M. Laurière (2022). Stochastic Graphon Games: I. The Static Case. *Mathematics of Operations Research*, *47(1)*, 750-778.
4. **D.B. Cooney** (2020). Analysis of Multilevel Replicator Dynamics for General Two-Strategy Social Dilemmas. *Bulletin of Mathematical Biology*, *82(6)*, 1-72.
3. **D.B. Cooney** (2019). The Replicator Dynamics for Multilevel Selection in Evolutionary Games. *Journal of Mathematical Biology*, *79(1)*, 101-154.
2. **D.B. Cooney**, B. Allen, & C. Veller (2016). Assortment and the Evolution of Cooperation in a Moran Process with Exponential Fitness. *Journal of Theoretical Biology*, *409*, 38-46.
1. V. Wong, **D. B. Cooney**, & Y. Bar-Yam (2016). Beyond Contact Tracing: Community-Based Early Detection for Ebola Response. *PLoS Currents: Outbreaks*.

PREPRINTS

1. T. Yao & **D.B. Cooney** (2025). Spatial Pattern Formation in Eco-Evolutionary Games with Environment-Driven Motion. *arXiv preprint arXiv:2502.06723*.

EXPOSITORY ARTICLES

2. **D.B. Cooney**, S.A. Levin, Y. Mori, & J.B. Plotkin. Modeling Natural Selection at Multiple Levels of Organization *SIAM News Blog*, October 2021.
1. **D.B. Cooney**. Report on SIAM DS21. *DS Web: The Dynamical Systems Web*, July 2021.

FUNDED GRANT

PI: **D.B. Cooney**. Simons Travel Support for Mathematicians MPS-TSM-00007872: "Modeling and Analysis of Evolutionary Dynamics at Multiple Levels of Organization", $42,000, 2024-2029.

HONORS & AWARDS

- Brad and Karen Smith Professorial Scholar, University of Illinois (2025-2028)
- List of Teachers Ranked as Excellent, University of Illinois (Fall 2023)
- Best Poster Award, 6th Butler Memorial Conference on Differential Equations and Population Biology, University of Alberta, Edmonton (July 2018)
- Princeton University C.V. Starr Fellowship (2015-2016 academic year)
- NSF Graduate Research Fellowship Honorable Mention in Mathematical Biology (2016) and in Applied Mathematics (2015)
- Harvard Program for Research in Science and Engineering (PRISE) Fellow (Summer 2013)
- Harvard University Certificate of Distinction in Teaching (Fall 2012)

TEACHING EXPERIENCE

Instructor, University of Illinois Urbana-Champaign

- Math 442: Partial Differential Equations — Spring 2026
- Math 558: Methods of Applied Mathematics — Fall 2024
- Math 495: Models in Mathematical Biology — Spring 2024, Spring 2025
- Math 441: Differential Equations — Fall 2023, Fall 2025

Instructor, University of Pennsylvania

- Math 5861 / Biology 5860: Mathematical Modeling in Biology — Fall 2022
- Math 104: Calculus I — Fall 2021

Co-Instructor, University of Pennsylvania

- AMCS 6035: Numerical and Applied Analysis II — Spring 2023

Assistant in Instruction, Princeton University

- EEB 533: Topics in Ecology: Theoretical Ecology — Fall 2018
- MAE 305 / MAT 391: Mathematics in Engineering I — Fall 2018
- APC 199: Math Alive — Spring 2018
- MAT 203: Advanced Vector Calculus — Fall 2017
- MAT 103: Calculus I — Fall 2016, Fall 2018
- MAT 175: Multivariable Calc for Econ/Life Sci — Fall 2016

Course Assistant, Harvard University

- Math 116: Real Analysis, Convexity, and Optimization — Fall 2012, Fall 2013
- Computer Science 20: Discrete Mathematics for Computer Science — Spring 2013
- Fun & Games with Discrete Mathematics — Jan. 2012, Jan. 2013
- Math 23b: Linear Algebra and Real Analysis II — Spring 2012
- Math 23a: Linear Algebra and Real Analysis I — Fall 2011

Guest Lecturer

- Nonlinear Dynamical Systems and Applications, UNESP: São Paulo State University — Jun. 2020

Courses Developed

- Math 495: Models in Mathematical Biology (University of Illinois) — Spring 2024
- Math 5861 / Biology 5860: Mathematical Modeling in Biology (University of Pennsylvania) — Fall 2022

Reading Course Supervision, University of Illinois

- Math 599: "Spatial Pattern Formation on Graph and Graphon Metapopulations (1 graduate student) Fall 2025
- Math 597: "Spatial Pattern Formation in Biology and Social Systems" (3 graduate students) Spring 2025
- Math 390: "Stochastic Simulations of Multilevel Selection" (1 undergraduate student Fall 2024
- Math 597: "PDE Models in Mathematical Biology" (1 masters student) Spring 2024
- Math 597: "Evolutionary Games and Evolutionary Dynamics" (1 graduate student) Fall 2023 - present
- Math 390: "Mathematical Bioeconomics" (1 undergraduate student) Fall 2023

Reading Course Supervision, University of Pennsylvania

- Graduate reading course: "Game-Theoretical Models in Biology" (1 PhD student) Spring 2023

Undergraduate Group Research Mentorship at University of Illinois

- Illinois Mathematics Lab project on "Spatial Spreading of Altruism: Beyond the Prisoner's Dilemma" (Spring 2026)
  - Project jointly organized with Olivia Clifton
  - Undergraduate Students: TBA
  - Graduate Mentor: Yuxuan Zhao
- Illinois Mathematics Lab project on "ODE and PDE Models for Cross-Scale Evolutionary Dynamics" (Spring 2026)
  - Undergraduate students: Gebran Hammoud, Jonas Liang, Naro Panjaitan
  - Graduate Mentors: Shlok
- Illinois Mathematics Lab project on "Mathematical Frameworks for Exploring Cross-Scale Evolutionary Dynamics" (Fall 2025)
  - Undergraduate students: Panyue (Dan) Chen, Samuel Li, Jonas Liang, Xuhan Pan, Naro Panjaitan, Ke Yao, Yixu Zheng
  - Graduate Mentors: Shlok Mulye, Muhammad Raza
- Illinois Mathematics Lab project on "Formation and Stability of Patterns in Spatial Models of Evolutionary Games" (Summer 2025)
  - Supported by Mrs. E.J. Hoover Program for Advanced Students in Mathematics
  - Undergraduate Students: Amy Bradu, Stanley Combes, David (Rui) Sang
  - Graduate Mentor: Yefei Zhang
- Illinois Mathematics Lab project on "Stochastic Process and Differential Equation Models for Cross-Scale Evolutionary Dynamics" (Spring 2025)
  - Undergraduate students: Ali Alhaj, Tiger Gao, Yiming Gao, Ahaan Kanaujia, Mavin Khanday, Justin Lee, Jonas Liang, Xiangyu Tan, Jiaqi Tang, Yichen Zhou
  - Graduate Mentors: Jiantong Liu, Muhammad Raza
- Illinois Mathematics Lab project on "Stochastic Models of Cross-Scale Evolutionary Dynamics" (Fall 2024)
  - Undergraduate students: Raghav Chandrasekar, Yiming Gao, Gebran Hammoud, Ahaan Kanaujia, Justin Lee, Andrey Vlasov
  - Graduate Mentors: Jiantong Liu, Shlok Mulye, Muhammad Raza

- Illinois Mathematics Lab project on "Spatial Models of Evolutionary Dynamics" (Spring 2024)
  - Undergraduate students: Jirui Liu, Seokhwan Moon, Ahmad Rahman, Edwin Shen, Chenning Xu, Tianyong Yao
  - Graduate Mentor: Muhammad Raza
  - Project resulted in paper published in *Bulletin of Mathematical Biology* (see paper [14] above).

Other Student Research Mentorship

- *A PDE Model of Spatial Public Goods Dilemmas*
  - Spring-Fall 2025: Yefei Zhang, Yuxuan Zhao, and Kaisheng Zhu (Mathematics graduate students, University of Illinois)
- *Incorporating Light and Temperature Effects in Models of Algal Blooms in Lakes*
  - Summer-Fall 2025: Isaac Ang (Mathematics and Computer Science, University of Illinois '28)
- *Cross-Scale Model of Viral Dynamics*
  - Summer-Fall 2025: Faiz Mohammad (Mathematics and Computer Science, University of Illinois '28)
- *Stochastic Models of Cultural Evolution via Multilevel Selection*
  - Spring-Summer 2025: Ahmad Rahman (Mathematics, University of Illinois '25)
- *Stochastic Process and PDE Models of Multilevel Selection with Pairwise Incentives of Reward or Punishment*
  - Spring-Fall 2025: Panyue [Dan] Chen (Mathematics and Computer Sciences, University of Illinois '26) and Tianyong Yao (Mathematics and Physics, University of Michigan '26)
- *Spatial Evolutionary Game Dynamics with Environmental Feedback*
  - Summer 2024: Tianyong Yao (Mathematics and Physics, University of Illinois '26)
  - Tianyong was supported by a Research Support Grant from the Illinois Undergraduate Research Office
  - Project resulted in preprint manuscript under revision at *Theoretical Ecology* (paper [14] above)
- *Stochastic and PDE Models of Multilevel Selection with Pairwise Between-Group Competition*
  - Spring 2023: Konstantinos Alexiou (Visiting graduate student from University of St Andrews)
  - Project resulted in paper published in *Bulletin of Mathematical Biology* (paper [13] above)
- *Spatial property rights as a management strategy for common-pool resources* (with D.H. Morris and S.A. Levin)
  - Summer 2017: Alice Lin (Mathematics, Princeton University '20)

CURRENT SEMINAR ORGANIZATION

- Midwest Mathematical Biology Seminar, virtual (with N. Wei) — Fall 2024 to present
- Student Reading Group in Mathematical Biology, University of Illinois Urbana-Champaign — Spring 2024 to present
- Mathematical Biology Seminar, University of Illinois Urbana-Champaign (with L. DeVille, Z. Rapti, & P. Yu) — Fall 2023 to present

WORKSHOP ORGANIZATION

- NITMB Workshop on "Evolutionary Games: Mathematical Theory and Biological Insights" (with O. Chu, A. McAvoy, and J. Plotkin) — May 2026
- 2nd Virtual Workshop on Modeling and Applications of Evolutionary Games (with O. Chu & A. McAvoy) — May 2025
- Virtual Workshop on Modeling and Applications of Evolutionary Games (with A. McAvoy) — Dec. 2023
- AMS Mathematical Research Community on Complex Social Systems (with H. Zinn Brooks, M. Feng, M.A. Porter, & A. Volkening) — Jun. 2023

SEMINAR AND COLLOQUIUM TALKS

- Theoretical Biology Seminar, Pennsylvania State University — Mar. 2026
- Applied Mathematics Seminar, University of Cincinnati — Mar. 2026
- Bi-College Math Colloquium, Bryn Mawr College and Haverford College — Feb. 2026
- Mathematical Biology Seminar, University of British Columbia, Vancouver — Oct. 2025
- Maud Menton Institute Mathematical Biology Seminar, University of Manitoba — Oct. 2025
- MathBio Seminar, Virginia Tech (virtual) — Sep. 2025
- PDE Seminar, The Ohio State University — Apr. 2025
- Applied Mathematics Colloquium, University of North Carolina, Chapel Hill — Mar. 2025
- Mathematical Biology Seminar, University of Pennsylvania — Mar. 2025
- T-6 Seminar, Theoretical Biology and Biophysics Program, Los Alamos National Laboratories (virtual) — Feb. 2025
- Applied Mathematics Seminar, University of New Mexico (virtual) — Feb. 2025
- Mathematical Biology Seminar, Iowa State University (virtual) — Sep. 2024
- Mathematical Biology Seminar, University of California, Davis — May 2024
- Mathematics Colloquium, George Mason University — Apr. 2024
- Mathematical Biology Seminar, Duke University — Oct. 2023
- Mathematical Biology Seminar, University of Maryland, College Park — Apr. 2023
- Mathematics Colloquium, University of Vermont — Feb. 2023
- Special Mathematics Colloquium, Purdue University — Jan. 2023
- Special Mathematics Colloquium, Rutgers University — Dec. 2022
- Special Colloquium in Mathematical Biology, University of Illinois Urbana-Champaign — Dec. 2022
- Special Mathematics Colloquium, University of Tennessee, Knoxville — Dec. 2022
- Mathematical Sciences Colloquium, Rensselaer Polytechnic Institute — Nov. 2022
- Mathematical Biology Seminar, University of Minnesota (virtual), — Oct. 2022
- Mathematics Colloquium, Dartmouth College, Hanover, NH — Apr. 2022
- Probability Seminar, Indiana University, Bloomington (virtual) — Mar. 2022
- Mathematical Biology Seminar, New Jersey Institute of Technology (virtual) — Mar. 2022
- Mathematical Biology Seminar, Arizona State University (virtual) — Feb. 2022
- Biomathematics Seminar, Virginia Commonwealth University (virtual) — Feb. 2022
- PDE Seminar, The Ohio State University (virtual) — Jan. 2021
- Mathematical Biology Seminar, Brandeis University (virtual) — Apr. 2020
- Probability Seminar, Indiana University, Bloomington — Jan. 2020
- Mathematical Biology Seminar, University of Pennsylvania — Jan. 2020
- Applied Mathematics Seminar, University of Victoria — Jul. 2018

MINISYMPOSIUM AND SPECIAL SESSION TALKS

- Joint Mathematics Meetings (Special Session on Mathematical Modeling of Complex Systems, Washington, DC — Jan. 2026

- Joint Mathematics Meetings (Special Session on Stochastic Processes in Biology), Washington, DC — Jan. 2026
- SIAM Central States Sectional Meeting, University of Arkansas — Oct. 2025
- SIAM Great Lakes Sectional Meeting, Illinois Institute of Technology — Sep. 2025
- SMB Annual Meeting (Minisymposium on Modeling Complex Dynamics in Biological Processes), University of Alberta — Jul. 2025
- SMB Annual Meeting, (Minisymposium on Applications of Evolutionary Game Theory and Related Frameworks), University of Alberta — Jul. 2025
- SIAM Conference on Applications of Dynamical Systems, Denver, CO — May 2025
- AMS Western Sectional Meeting, Cal Poly San Luis Obispo — May 2025
- Joint Mathematics Meetings, Seattle, WA — Jan. 2025
- AMS Eastern Sectional Meeting, SUNY Albany — Oct. 2024
- SIAM Conference on the Life Sciences, Portland, OR — Jun. 2024
- AMS Western Sectional Meeting, San Francisco State University — May 2024
- AMS Eastern Sectional Meeting (Special Session on Mathematics of Infectious Disease), Howard University — Apr. 2024
- AMS Eastern Sectional Meeting (Special Session on Complex Systems in the Life Sciences), Howard University — Apr. 2024
- Dynamics Days US, University of California, Davis — Jan. 2024
- Joint Mathematics Meetings, San Francisco, CA — Jan. 2024
- SIAM Great Lakes Sectional Meeting, Michigan State University — Oct. 2023
- CMS Summer Meeting, University of Ottawa — Jun. 2023
- AMS Western Sectional Meeting, California State University, Fresno — May 2023
- AMS Southeastern Sectional Meeting, Georgia Tech — Mar. 2023
- AMS Western Sectional Meeting, University of Utah — Oct. 2022
- AMS Eastern Sectional Meeting, UMass Amherst — Oct. 2022
- MAA MathFest, Philadelphia, PA — Aug. 2022
- Joint Mathematics Meetings (virtual) — Apr. 2022
- AMS Eastern Sectional Meeting (virtual) — Mar. 2022
- AMS Eastern Sectional Meeting (virtual) — Mar. 2020
- AMS Western Sectional Meeting, University of California, Riverside — Nov. 2019
- AMS Southeastern Sectional Meeting, Auburn University — Mar. 2019
- AMS Eastern Sectional Meeting, University of Delaware — Sep. 2018

INVITED WORKSHOP TALKS

- Workshop on Bifurcations and Chaos in Population Biology, Brin Center for Mathematical Research, University of Maryland, College Park — May 2025
- BIRS Workshop on Dynamical Models Inspired by Biology, Banff, Alberta — Oct. 2024

CONFERENCE PANELIST

- Workshop on Artificial Intelligence and Game Theory: An Intersection of Theory and Applications, Joint Mathematics Meetings, Seattle, WA — Jan. 2025

LOCAL SEMINARS AT UNIVERSITY OF ILLINOIS

- GEMinar, Genomics and Eco-evolution of Multi-scale Symbioses Institute — Sep. 2025
- What is ...? Seminar, Department of Mathematics — Apr. 2025
- Infection Genomics One Health Seminar, Institute for Genomic Biology — Oct. 2024

CONTRIBUTED TALKS

- Dynamics Days US, University of Arizona — Jan. 2026
- IBA Symposium on Biomathematics and Ecology Education and Research, George Mason University — Nov, 2025
- Dynamics Days US, Denver, CO — Jan. 2025
- Mathematical Models in Ecology & Evolution Conference, University of Vienna, AT — Jul. 2024
- BAMM: Biology and Medicine Through Mathematics Conference, Virginia Commonwealth University — May 2024
- Biomath Day 2024, Rose Hulman Institute of Technology — Feb. 2024
- Workshop on Evolutionary Transitions in Individuality, Max Planck Institute for Evolutionary Biology, Plön, Germany — May 2023
- Joint Mathematics Meetings, San Francisco, CA — Jan. 2024
- SMB Annual Meeting, The Ohio State University — Jul. 2023
- BAMM: Biology and Medicine Through Mathematics Conference, Virginia Commonwealth University — May 2023
- MAA EPaDel Sectional Meeting, Penn State Brandywine — Apr. 2023
- Mathematical Models in Ecology & Evolution Conference, University of Reading, UK — Jul. 2022
- SIAM Annual Meeting, Pittsburgh, PA — Jul. 2022
- SIAM Conference on the Life Sciences, Pittsburgh, PA — Jul. 2022
- SIAM Conference on Mathematics of Planet Earth, Pittsburgh, PA — Jul. 2022
- Joint Mathematics Meetings (virtual) — Apr. 2022
- MAA EPaDel Sectional Meeting (virtual) — Apr. 2022
- Northeast Regional Conference on Complex Systems (virtual) — Mar. 2022
- APS March Meeting, Chicago, IL — Mar. 2022
- Dynamics Days US, online — Jan. 2022
- APS Mid-Atlantic Section Meeting, Rutgers University — Dec. 2021
- IBA Annual Symposium on Biomathematics and Ecology Education and Research (virtual) — Nov. 2021
- Learning, Evolution, and Games Conference (virtual) — Sep. 2021
- Dynamics Day Europe XL, Nice, France (virtual) — Aug. 2021
- SIAM Conference on Applications of Dynamical Systems (virtual) — May 2021
- MAA EPaDel 2021 Virtual Spring Section Meeting, online — Apr. 2021
- Northeast Regional Conference on Complex Systems (virtual) — Apr. 2021
- SMB Annual Meeting (virtual) — Aug. 2020
- SIAM Conference on Mathematics of Planet Earth, Garden Grove, CA (canceled) — Jun. 2020
- SIAM Conference on the Life Sciences, Garden Grove, CA (canceled) — Jun. 2020
- Northeast Regional Conference on Complex Systems (virtual) — Apr. 2020
- Collective Information Processing, Humboldt University of Berlin — Mar. 2020
- Joint Mathematics Meetings, Denver, CO — Jan. 2020
- Flash Talk: Dynamics Days US, Hartford, CT — Jan. 2020
- ICMA VII: Mathematical Modeling and Analysis of Populations in Biological Systems, Arizona State University, Tempe — Oct. 2019
- Levin Fest: A Symposium at the Intersection of Mathematics and Biology, University of Victoria — Jun. 2019
- SIAM Conference on Applications of Dynamical Systems, Snowbird, UT — May 2019
- APS March Meeting, Boston, MA — Mar. 2019
- Joint Mathematics Meetings, Baltimore, MD — Jan. 2019
- Dynamics Days US, Evanston, IL — Jan. 2019

- Workshop on Evolutionary Models of Structured Populations, Max Planck Institute for Evolutionary Biology, Plön, Germany — Sep. 2018
- Finger Lakes Probability Seminar, Syracuse University — Apr. 2017
- 18 talks at Princeton Theoretical Ecology Lab Tea and 6 talks at Princeton PACM Graduate Student Seminar — 2015-2023

TALKS FOR UNDERGRADUATE OR GENERAL AUDIENCE

- REU Colloquium, Indiana University, Indianapolis (online) — Jul. 2025
- Keynote Talk, Darwin Week, College of Charleston — Feb. 2025
- YSSP Final Colloquium, IIASA, Laxenburg, Austria — Aug. 2017
- Leverett House Murdock Thesis Dinner, Harvard University — May 2014
- Harvard Undergraduate Mathematics Colloquium — Nov. 2013
- Harvard PRISE Final Presentation — Aug. 2013

POSTER PRESENTATIONS

- Dynamics Days US (virtual) — Jan. 2023
- Workshop on Advances in Mathematical Ecology, The Fields Institute, Toronto, ON — Dec. 2022
- SIAM Conference on Analysis of Partial Differential Equations (virtual) — Mar. 2022
- SMB Annual Meeting (virtual) — Jun. 2021
- SIAM Workshop on Network Sciences (virtual) — Jul. 2020
- SMB Annual Meeting, Montreal, QC — Jul. 2019
- Conference on the Evolution of Complex Life, Georgia Tech, Atlanta — May 2019
- LMS School on PDEs in Mathematical Biology, ICMS, Edinburgh, UK — Apr. 2019
- KI-Net Young Researchers Workshop on Kinetic Descriptions in Theory and Applications, University of Maryland, College Park — Oct. 2018
- 6th Butler Memorial Conference on Differential Equations and Population Biology, University of Alberta, Edmonton — Jul. 2018
- XXXV Dynamics Days US, Durham, NC — Jan. 2016

TRAVEL FUNDING

- SIAM Early Career Travel Grant, SIAM Conference on the Life Sciences — July 2022
- Collaborate@ICERM Funding to participate in small working group on "Mathematical Models of Pedestrian Movement in Large Lecture Halls" — Jun. 2021
- SIAM Student Travel Grant, SIAM Workshop on Network Science (in-person conference canceled due to Covid-19) — Jul. 2020
- SIAM Student Travel Grant, SIAM Conference on Applications of Dynamical Systems — May 2019
- AMS Graduate Student Travel Grant, AMS Fall Eastern Sectional Meeting — Sep. 2018

WORKSHOPS & SUMMER SCHOOLS

- NITMB Workshop on Mathematics of the Origin of Life and Self-Organized Complexity — May 2025
- NSF-Simons National Institute for Theory in Mathematics and Biology Annual Meeting, — Apr. 2025
- DIMACS Workshop on Spreading on Social Networks – Theory and Applications — Oct. 2024
- LMS Research School on "PDEs in Mathematical Biology", ICMS, Edinburgh, UK — Apr. 2019
- Global Biosocial Complexity Initiative Winter School on "Agent-Based Modeling of Social-Ecological Systems", Arizona State University — Jan. 2019
- MBI Current Topics Workshop on"Collective Behavior and Emergent Phenomena in Biology", Ohio State University — Sep. 2018

- AMS Mathematics Research Community on "Agent-Based Modeling in Biological and Social Systems", West Greenwich, RI — Jun. 2018
- "Winter Workshop on Complex Systems", University of Utrecht, Netherlands — Feb. 2018
- KI-Net Workshop on "Mean-field modeling and multiscale methods for complex physical and biological systems", UC Santa Barbara — Sep. 2016
- KI-Net Summer School on "Quantum and Kinetic Theory for Complex Systems", UC Santa Barbara — Jun. 2016
- AIM workshop on "Mathematics Inspired by Immuno-Epidemiology", San Jose, CA — Aug. 2015
- IPAM summer school on "Games and Contracts for Cyber-Physical Security" — Jun. 2015

ACADEMIC SERVICE

Minisymposium Organizer

- "Mathematics Inspired by Biology", AMS Central Sectional Meeting, North Dakota State University (with A. Novozhilov) — Apr. 2026
- "Mathematical Modeling of Ecological and Evolutionary Dynamics", AMS Eastern Sectional Meeting (with A. McAvoy and T. Zdyrski) — Mar. 2026
- "Applications of Evolutionary Game Theory and Related Frameworks: From Cells to Societies", SMB Annual Meeting, University of Alberta (with O.J. Chu and A. McAvoy) — July 2025
- "Dynamical Systems Models for Spatial and Group-Structured Populations", SIAM Conference on Applications of Dynamical Systems, Denver, CO — May 2025
- "Mathematical Models of Ecology, Evolution, and Collective Behavior", AMS Western Sectional Meeting, California Polytechnic State University, San Luis Obispo (with C.M. Saad-Roy) — May 2025
- "Dynamical Systems Modeling Approaches Across Multiple Biological Scales", Joint Mathematics Meetings, Seattle, WA (with C.M. Heggerud and C.M. Saad-Roy — Jan. 2025
- "Agent-Based and Mean-Field Models for Complex Social Systems," AMS Eastern Sectional Meeting, University at Albany (with R. Hardenbrook and J. Park) — Oct. 2024
- "Multilevel Modeling of Eco-Evolutionary Dynamics", Mathematical Models in Ecology and Evolution, University of Vienna (with C. Pokalyuk) — Jul. 2024
- "Evolutionary Game Theory for Modeling Biological and Social Systems", SIAM Conference on the Life Sciences, Portland, OR (with O.J. Chu and A. McAvoy) — Jun. 2024
- "Mathematical Modeling of Social-Ecological Systems", SIAM Conference on Mathematics of Planet Earth, Portland, OR (with C.M. Saad-Roy) — Jun. 2024
- "Mathematical Modeling of Complex Ecological and Social Systems", AMS Western Sectional Meeting, San Francisco State University (with M. Kawakatsu and C.M. Saad-Roy) — May 2024
- "Mathematics of Infectious Diseases: A Session in Memory of Dr. Abdul-Aziz Yakubu", AMS Eastern Sectional Meeting, Howard University (with A. Gumel and C.M. Saad-Roy) — Apr. 2024
- "Physics of Human Social Systems", APS March Meeting, Minneapolis, MN (with J. Johnson and E. Zajdela) — Mar. 2024
- "Dynamical Systems Modeling for Biological and Social Systems", Joint Mathematics Meetings, San Francisco, CA (with C.M. Heggerud and C.M. Saad-Roy) — Jan. 2024
- "Modeling and Analysis of Evolutionary Dynamics Across Scales and Fields of Application", SMB Annual Meeting, The Ohio State University (with O.J. Chu) — Jul. 2023
- "Multiscale Approaches to Modeling Ecological and Evolutionary Dynamics", AMS Southeastern Sectional Meeting, Georgia Institute of Technology (with O.J. Chu, D.D. Patterson, and C.M. Saad-Roy) — Mar. 2023

- "Mathematical Modeling of Ecology and Evolution: From Infectious Disease to the Evolution of Cooperation", Joint Mathematics Meetings, Boston, MA (with B. Allen, O.J. Chu, and C.M.Saad-Roy) Jan. 2023
- "Mathematical Modeling of Biological and Social Systems", AMS Western Sectional Meeting, University of Utah (with D. Gomez and H. Kim) Oct. 2022
- "Game-Theoretic and Agent-Based Approaches to Modeling Biological and Social Systems", AMS Eastern Sectional Meeting, University of Massachusetts, Amherst (with O.J. Chu) Oct. 2022
- "Modeling Biological and Social Systems Using Evolutionary Game Theory", SIAM Conference on the Life Sciences, Pittsburgh, PA Jul. 2022
- "Mathematical Modeling of Population Dynamics across Scales: from Immuno-Epidemiology to Multilevel Selection", Joint Mathematics Meetings, online (with C.M. Saad-Roy) Apr. 2022
- "Mathematical Methods for Ecology and Evolution in Structured Populations", AMS Eastern Sectional Meeting, online (with O.J. Chu and C.M. Saad-Roy) Mar. 2022
- "Collective Behavior and Social Evolution", SMB Annual Meeting, online (with O.J. Chu) June 2021
- "Dynamical Systems Approaches for Biological and Cultural Evolution'', SIAM Conference on Applications of Dynamical Systems, online (with O.J. Chu and C.M. Saad-Roy) May 2021
- "Emergence and Stability of Population Structure and Biological Aggregates Across Scales", SMB Annual Meeting, online (with O.J. Chu) Aug. 2020
- "Mathematical Methods for Ecology and Evolution in Structured Populations", online session held in place of in-person AMS Sectional Meeting (with O.J. Chu and C.M. Saad-Roy) Mar. 2020

Prior Seminar Organizer

- Mathematical Biology Seminar, University of Pennsylvania Fall 2020, Fall 2021
- Princeton NSF Research Training Grant Seminar Series on "Mathematical Methods for Water Problems" 2018-2020
- Princeton Theoretical Ecology Lab Tea (with C. Cabal) Fall 2017

Conference Organizing Committee Member

- SMB Epi-PDEE Mini-Conference: Joint meeting between the Mathematical Epidemiology and Population Dynamics, Ecology, & Evolution Subgroups Feb. 2023

Academic Mentor

- Mentoring Program, SMB Annual Meeting (online) June 2021
- Mentor/Coach for final presentations of undergraduate applied mathematics senior independent work Spring 2020
- Princeton Mathematics Mentoring Möbius Program 2017-2020
- Non-Resident Tutor, Leverett House, Harvard University 2014-2015

Committee Member at University of Illinois

- Colloquium & Named Lecture Committee, Department of Mathematics 2025-2026
- General Education Committee, College of Liberal Arts & Sciences 2024-2026
- Teaching Awards Committee, Department of Mathematics 2024-2025
- Postdoctoral Hiring Committee, Department of Mathematics 2023-2024

Other Committee Service

- SMB Social Media Committee 2024
- Advisory Committee for SMB Subgroup on Population Dynamics, Ecology, and Evolution 2024
- Alumni Undergraduate Admissions Interviewer, Harvard University 2021-2024

- Math Club Committee, University of Pennsylvania 2021-2022
- Rights & Rules Committee, Council of the Princeton University Community 2019-2020
- Princeton Graduate Student Government Representative for PACM 2017-2020
- Princeton University Ad Hoc Committee on Campus Recreation 2017-2020

Referee

Acta Mathematica Scientia
Applied Mathematics and Computation
BioSystems
Bulletin of Mathematical Biology
Chaos, Solitons & Fractals
Communications Biology
Dynamic Games and Applications
Evolution
Funkcialaj Ekvacioj
Games
Games and Economic Behavior
IEEE Computational Intelligence Magazine
IEEE Conference on Decision and Control
International Journal of Game Theory
Journal of Biological Dynamics
Journal of Evolutionary Biology
Journal of Mathematical Biology
Journal of the Royal Society Interface
Journal of Theoretical Biology
Mathematical Biosciences
Mathematics
New Journal of Physics
Physica D
PLoS Computational Biology
PLoS One
PNAS
Proceedings of the Royal Society, A
Proceedings of the Royal Society, B
SIAM Journal on Applied Dynamical Systems
Scientific Reports
Theoretical Population Biology
Theory and Decision

Grant Ad Hoc Peer Reviewer

- Banff International Research Station for Mathematical Innovation and Discovery, Canada October 2025
- Mathematics & Physical Sciences Division, Simons Foundation April 2025
- Division of Integrative Organismal Systems, National Science Foundation, USA May 2023
- Ecology and Evolution Panel, NRDI Office, Hungary Apr. 2022

Interviews / Public Engagement

- "Using mathematical models to explore cross-scale biological dynamics", Interview for NSF-Simons NITMB website Sept. 2025
- Biology in Numbers Podcast (the Podcast for SMB) Apr. 2025
- Skype a Scientist, 11th-grade Biology, Moorestown Friends School Jan. 2023

Academic Mentor

- Mentor/Coach for final presentations of undergraduate applied mathematics senior independent work Spring 2020
- Princeton Mathematics Mentoring Möbius Program 2017-2020
- Co-mentored Princeton undergraduate Alice Lin on research project "Spatial property rights as a management strategy for common-pool resources" (with D.H. Morris and S.A. Levin) Summer 2017
- Non-Resident Tutor, Leverett House, Harvard University 2014-2015

Conference Poster/Talk Judge

- Poster Award Committee, SMB Annual Meeting — Jul. 2025
- Red Sock Poster Award, SIAM Conference on Applications of Dynamical Systems — May 2025
- Population Dynamics & Ecology Poster Session, SMB Annual Meeting — Jul. 2023
- AMS-PME Undergradute Poster Session, Joint Mathematics Meetings — Apr. 2022
- Population Dynamics & Ecology and Complex Biological and Biomedical Systems Contributed Talk Sessions, SMB Annual Meeting, online — Jun. 2021
- Population Dynamics, Ecology, & Evolution Poster Session, SMB Annual Meeting, online — Aug. 2020

Science Fair Judge

- Princeton Research Day (virtual) — May 2023
- Bucks County Science Fair, Doylestown, PA — Mar. 2023
- Pennsylvania Junior Academy of Science, Region 1A Meet, Springfield, PA — Mar. 2023
- Montgomery County Science Fair, Fort Washington, PA — Mar. 2022
- Delaware Valley Science Fair, Oaks, PA — Apr. 2021, Apr. 2022

Seminar Discussant

- Economics and Finance Seminar, LUISS Guido Carli, Rome, Italy (held online) — Nov. 2020

SHORT-TERM RESEARCH POSITIONS

Visiting Graduate Researcher — June 2017 — August 2017
International Institute for Applied Systems Analysis — Laxenberg, Austria
Participant in Young Scientists Summer Program (YSSP)

Researcher — September 2014 — August 2015
New England Complex Systems Institute — Cambridge, MA

Undergraduate Researcher — January 2013 — August 2013
Harvard Program for Evolutionary Dynamics — Cambridge, MA

COMPUTER SKILLS

Proficient with Python, Mathematica, MATLAB, LaTeX; Familiar with C

PROFESSIONAL SOCIETIES

Society for Industrial and Applied Mathematics (SIAM): 2015 to present
American Mathematics Society (AMS): 2018 to present
American Physical Society (APS): 2018 to present
Society for Mathematical Biology (SMB): 2020 to present
Mathematical Association of America (MAA): 2021 to present
Society for Modeling and Theory in Population Biology (SMTPB): 2024 to present