

David Sabin-Miller

Curriculum Vitae

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Positions

University of Michigan, Ann Arbor, MI

- Postdoctoral Research Fellow, Center for the Study of Complex Systems: September 2022-current
 - Mentor: Marisa Eisenberg

Education

Northwestern University, Evanston, IL

- PhD, Engineering Sciences and Applied Mathematics: December 2022
 - National Science Foundation Graduate Research Fellow
 - Advisor: Daniel M. Abrams
- M.S., Engineering Sciences and Applied Mathematics: June 2018

Oberlin College, Oberlin, OH

- B.A. in Mathematics, Minor in Computer Science 2015

Publications

1. D. Sabin-Miller and C. Harding, “Data-driven modeling of U.S. ideological dynamics”, *preprint*: <https://doi.org/10.48550/arXiv.2510.11983>
2. D. Sabin-Miller, M. McGrath, and M. Eisenberg, “A political spectrograph: high-resolution examinations of the United States’ ideological landscape”, *under review at PLoS One*. *preprint*: <https://doi.org/10.48550/arXiv.2501.08433>
3. D. Sabin-Miller and D. M. Abrams, “Equilibrium moment analysis of Itô SDEs”. *preprint*: <https://doi.org/10.48550/arXiv.2502.00918>
4. D. Sabin-Miller and D. M. Abrams, “Interpretation of generalized Langevin equations”. *preprint*: <https://doi.org/10.48550/arXiv.2210.03781>
5. D. Sabin-Miller and D. M. Abrams, “A Mexican hat dance: Clustering in spatially non-exclusive particle systems”, *Chaos: An Interdisciplinary Journal of Applied Science*, 1 September (2025); 35 (9): 093140. <https://doi.org/10.1063/5.0271815>
6. D. Sabin-Miller and D. M. Abrams, “When pull turns to shove: A continuous-time model for opinion dynamics”, *Physical Review Research*, Vol. 2, No. 4, (2020) 043001. <https://link.aps.org/doi/10.1103/PhysRevResearch.2.043001>

Dissertation

D. Sabin-Miller, “Nonlinear modeling: politics, stochastics, and a Mexican hat dance”
Dissertation, December 2022

In preparation

D. Sabin-Miller, “Support for political topics across the ideological spectrum”, (*draft available at david-sm.com/papers*)

Presentations

“Data-driven modeling of US information-ideological dynamics.” Society for Mathematical Biology Annual Meeting 2025, for minisymposium “Modeling Social and Political Ecosystems,” July 16, 2025

“Ideology-ology: Reality-seeking dynamical modeling of the U.S. political ecosystem.” Seminar, University of Michigan Center for Applied and Interdisciplinary Mathematics, Nov 1, 2024

“Ideology-ology: Diagnostic perspectives and reality-seeking dynamical modeling of the U.S. political ecosystem.” Seminar, University of Michigan Center for the Study of Complex Systems, April 28, 2024

“When Pull Turns to Shove: Modeling how tribalism and biased environments give rise to ideological distributions.” Seminar, University of Michigan Center for the Study of Complex Systems, October 4, 2022

“Randomness Inside Nonlinearity” American Physical Society March Meeting 2022, invited focus session “Noise-Driven Dynamics in Far-From-Equilibrium Systems II,” March 17, 2022

“When Pull Turns to Shove: Modeling how tribalism and biased environments give rise to ideological distributions.” Society for Industrial and Applied Mathematics Conference on Applications of Dynamical Systems (SIAM DS21), part of MS167 “Modeling Opinion Dynamics in Complex Social Systems,” via Zoom, May 26, 2021

“When Pull Turns to Shove: Modeling how tribalism and biased environments give rise to ideological distributions.” Northwestern Institute for Complex Systems, Dec 2, 2020

“Physics of Parkour.” Volunteer outreach class for Applied Math in Action. Multiple sections, Spring 2019-Winter 2020

“Weirdos from another dimension! An introduction to fractals.” Volunteer outreach class for Splash at Northwestern (2 sections) Apr 6, 2019

“Mathemagics: A card trick, and introduction to numerical bases.” Volunteer outreach class for Applied Math in Action. Multiple sections, Fall 2017-Spring 2019

“Tricking.” Student seminar, Oct 27 2017

“Principles of Parkour.” Student seminar, Oct 13 2017

Media Coverage

“11 experts explain how our digital world is fueling polarization.” By Tyler Sonnemaker, *Business Insider*, Dec 28, 2020.

“Why Social Media Is So Good at Polarizing Us.” By Christopher Mims, *The Wall Street Journal*, Oct 19, 2020.

“New model examines how societal influences affect U.S. political opinions.” By Amanda Morris, *Northwestern Now*, Sept 28, 2020. (Reprinted by *Phys.org*, *EurekAlert!*, and *ScienMag*)

Experience

- **Organizer, Minisymposium “Modeling Social and Political Ecosystems”** (July 2025)
 - Society for Mathematical Biology Annual Meeting 2025
- **Instructor, Nonlinear Dynamics and Chaos** (Fall 2024)
 - See teaching evaluation by Jeff Dunworth
- **Co-organizer, Machine Learning, AI, and Chaos** (Fall 2022-Fall 2024)
 - Journal club exploring topics in AI/ML interpretability, dynamics, and chaos
 - Co-organized with Jeff Dunworth
- **Organizer, Mechanism and Measurement in Social Science** (Fall 2022-Spring 2023)
 - Graduate/postdoc journal club exploring issues with collecting and incorporating social-science data
- **Instructor, Introduction to Modeling Political Processes** (Fall 2023, Fall 2025)
 - Largely re-worked and re-framed curriculum, adding discussion of voting systems, gerrymandering, game theory, memetics, and opinion dynamics
- **Instructor, Introduction to Agent-Based Modeling** (Winter/Fall 2023, Winter 2024, Winter/Fall 2025)
 - Re-formulated and re-vamped classic core course for CSCS, introducing very broad student base to Python, classic ABMs, data visualization, and complex systems principles, including genetic algorithms and AI
 - Consistently positive anonymous student feedback, e.g.:
 - “I LOVE DSM!!! He is so funny and makes the content interesting as you can tell he is very passionate about it. Great teacher !!!!”
 - “DSM was a great teacher, clearly very enthusiastic about the topics taught and was very approachable and light hearted.”
- **Instructor, Multivariable Calculus, EXCEL program** (Summer 2022)
 - Month-long intensive ramp-up program for incoming freshmen at Northwestern
 - Multivariable vector logic, differentiation, integration, and coordinate transforms covered in three weeks
 - Extremely positive anonymous student feedback
- **Teaching Assistant, Applied Dynamical Systems** (Spring 2022)
- **Teaching Assistant, Integral Vector Calculus** (Winter 2022)

- **Assistant Lecturer/Teaching Assistant, Honors Calculus for Engineers** (Fall 2021)
 - One lecture per week, formulated and taught independently
 - Sample of anonymous student feedback:
 - "The TA David is a SAVIOR – he is the only reason why I was able to get through the class."
 - "The TA David was a saint and made such a difference."
 - "If you're ever stuck on literally anything: GO TO OFFICE HOURS – David the TA is INCREDIBLE and will save your life."
- **Applied Math in Action presenter** (Fall 2017 - Winter 2020)
 - Formulated exciting ways to teach math concepts to high school students: "Mathemagic" card tricks, physics of parkour, and others
- **Splash at Northwestern instructor** (Spring 2019)
 - "Introduction to Fractals" (2 sections) for area high school students
- **Private Tutor** (2010-2017)
 - Full-time (2015-2017) math/science/economics tutor in Manhattan and Brooklyn, primarily NYU and Columbia University students
 - Maintained top ratings with both Varsity Tutors and Gooroo platforms
- **Oberlin College ExCo Instructor** (Spring 2015)
 - Formulated and taught two semester-long for-credit courses, Parkour and Tricking
 - These courses involved dealing with lots of different comfort levels, and helping all students gain physical skills and confidence.
- **Math-Soccer camp counselor**, (Summer 2012) *DuBois Project*
 - Encouraged a fun outlook on mathematics and physical activity for underprivileged local kids

Awards and Honors

GRE: 170 Quantitative, 170 Verbal (Perfect Score)
 Ernest Hatch Wilkins Memorial Prize Winner 2014 (college-wide highest GPA in the sciences)
 Phi Beta Kappa Junior Inductee 2014
 Oberlin High School: Valedictorian and Class President
 National Merit Scholar Finalist, Recipient
 36 Composite ACT (Perfect Score)

Other Experience/Activities

Software tester/programmer, Atlas Learning Inc.
 Children's gymnastics/parkour instructor
 Enthusiast/Practitioner: figure skating, tricking (acrobatic martial arts), parkour, soccer, tennis, table tennis, badminton, ultimate frisbee, bowling, unicycling, french horn, trumpet
 Oberlin College Student Circus (OCircus):
 3-year performer (stage combat, parkour, tumbling, tricking)
 1-year director, writer, and set designer.
 5th Grade: independently discovered Gauss' summation trick when asked to sum 1 through 100