Leif Zinn-Brooks

Contact Information

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Research Interests

Applied mathematics, mathematical biology, differential equations, developmental biology, cell motility, circadian rhythms, dung beetles

Academic Positions

Harvey Mudd College
Visiting Assistant Professor 2023-
Department of Mathematics

Claremont McKenna College
Visiting Assistant Professor 2022-2023
Department of Mathematics

Harvey Mudd College
Assistant Adjunct Professor 2021-2022
Department of Computer Science

Scripps College
Assistant Adjunct Professor Fall 2021
Department of Mathematics

Harvey Mudd College
Visiting Assistant Professor 2020-2021
Department of Mathematics

University of California, Los Angeles
Assistant Adjunct Professor (postdoctoral position) 2018–2020
Department of Mathematics

Education

University of Utah
Ph.D., Mathematics 2018
- Concentration: Mathematical Biology
- Advisor: Frederick Adler
- Dissertation topic: Mathematically modeling development of the zebrafish posterior lateral line

University of California, San Diego
B.S., Mathematics - Scientific Computation 2011
- Provost Honors

Publications

Yin, Zhanyuan† and **LZB** (2022). Mathematical modeling shows that ball-rolling dung beetles can use dances to avoid competition. *Journal of Theoretical Ecology* 15(1): 17-28.

LZB and Marcus L. Roper (2021). Circadian rhythm shows potential for mRNA efficiency and self-organized division of labor in multinucleate cells. *PLoS Computational Biology* 17(8): e1008828.

Yin, Zhanyuan† and **LZB** (2020). Simulating rolling paths and reorientation behavior of ball-rolling dung beetles. *Journal of Theoretical Biology* 486: 110106.

LZB and Frederick R. Adler (2018). Modeling factors that regulate cell cooperativity in the zebrafish posterior lateral line primordium. *Journal of Theoretical Biology* 444: 93-99.

† denotes undergraduate co-author

Talks and Presentations

Circadian rhythms in multinucleated cells (invited talk)
Applied Mathematics Seminar — Pomona College — October 2021
Claremont, CA

Stochastic modeling of circadian rhythm in a syncitium (contributed talk)
Joint Mathematics Meetings — January 2020
Denver, CO

Modeling factors that regulate cell cooperativity in the zebrafish posterior lateral line primordium (contributed talk)
Joint Mathematics Meetings — January 2019
Baltimore, MD

Establishing receptor polarity in the zebrafish posterior lateral line primordium (poster)
Society for Mathematical Biology — July 2017
Salt Lake City, UT

A mathematical model of cell cooperativity in the zebrafish posterior lateral line primordium (poster)
Society for Industrial and Applied Math, Life Sciences — July 2016
Boston, MA

Modeling migration of the zebrafish primordium (invited talk)
Leah Edelstein-Keshet research group, UBC — October 2015

Awards

UCLA Distinguished Teaching Award — 2019-2020

Travel Award: NSF-RTG Travel Grant for SIAM 2016 — 2016
$1000

NSF Research Training Grant Fellowship RTG-1148230 — 2015-2016
$20,457 per year

RTG Lab Rotation, Huntsman Cancer Institute (PI: Jody Rosenblatt) — Summer 2013
$2,500

Scientific Research Experience

Huntsman Cancer Institute (PI: Jody Rosenblatt) — Summer 2013
- Studied cell division in epithelia and zebrafish — investigated the characteristics of a dividing cell (size, shape, movement, etc.)

Los Alamos National Laboratory (PI: Bryan Travis) — Fall 2011
- Developed tests and implemented improvements to the Levenberg-Marquardt optimization algorithm (applications to inverse problems)

Teaching Experience

Claremont McKenna College

Spring	2023	Lecturer	Calculus I [Math 30]
Spring	2023	Lecturer	Calculus II [Math 31]
Fall	2022	Lecturer	Calculus II [Math 31] (sec. 1 & 2)

Scripps College

Fall	2021	Lecturer	Calculus I [Math 30]

Harvey Mudd College

Spring	2022	Advisor	Alation and Samba TV Clinic Teams
Fall	2021	Advisor	Alation and Samba TV Clinic Teams
Spring	2021	Lecturer	Intro. to Probability and Statistics [Math 62]
Spring	2021	Lecturer	Intro. to Mathematical Biology [Math 118A]
Spring	2021	Advisor	Alation and American Express Clinic Teams
Fall	2020	Advisor	Alation and American Express Clinic Teams
Fall	2020	Lecturer	Single and Multivariable Calculus [Math 19]

University of California, Los Angeles

Spring	2020	Lecturer	Mathematical Modeling [Math 142] (sec. 1 & 2)
Winter	2020	Lecturer	Ordinary Differential Equations [Math 135] (sec. 1 & 2)
Fall	2019	Lecturer	Ordinary Differential Equations [Math 135]
Fall	2019	Lecturer	Mathematical Modeling [Math 142]
Spring	2019	Lecturer	Mathematical Modeling [Math 142]
Spring	2019	Lecturer	Differential Equations [Math 33B]
Winter	2019	Lecturer	Mathematical Modeling [Math 142]
Winter	2019	Lecturer	Differential Equations [Math 33B]
Fall	2018	Lecturer	Mathematical Modeling [Math 142]
Fall	2018	Lecturer	Linear & Nonlinear Systems of Diff. Eqs. [Math 134]

University of Utah

Spring	2018	Lecturer	Quantitative Reasoning [Math 1030]
Fall	2017	Lecturer	Quantitative Reasoning [Math 1030]
Spring	2017	Lecturer	Quantitative Reasoning [Math 1030]
Fall	2016	Lecturer	Calculus II [Math 1220]
Spring	2015	Lecturer	College Algebra [Math 1050]
Fall	2014	Lecturer	Quantitative Reasoning [Math 1030]
Summer	2014	Lecturer	College Algebra [Math 1050]
Spring	2014	Teaching Assistant	Calculus II [Math 1220]
Fall	2013	Lecturer	Quantitative Reasoning [Math 1030]
Spring	2013	Teaching Assistant	Diff. Eq. and Linear Algebra [Math 2250]
Fall	2012	Teaching Assistant	Diff. Eq. and Linear Algebra [Math 2250]

Mathematics Teacher's Circle 2017–18
Monthly gathering of teachers to discuss interesting math problems and share ideas. Designed and facilitated session on divisibility puzzle.

Invited Workshops

Rules of Life in the Context of Future Mathematical Sciences
(invited participant) November 2018
Alexandria, VA

Mentorship of Student Research

Undergraduate Research in Mathematics, UCLA Jan. 2019–Sep. 2021
- Topic: Matlab simulations of rolling paths and reorientation behavior of ball-rolling dung beetles.
- Mentee: Zhanyuan Yin

Undergraduate Research in Mathematics, UCLA Spring 2019
- Topic: Cancer modeling — extended a model in a paper studying the effects of double-strand breaks on tumor growth.
- Mentee: Yunfeng Wang

Mathematical Biology REU (co-mentor Owen Lewis) 2015–16
- Topic: Cell migration — students simulated and extended migration model by Gracheva and Othmer (2003).
- Mentees: Olivia Dennis, Naveen Rathi, Gerardo Rodriguez, Nathan Willis

Service and Outreach

Co-mentor for students participating in Mathematical Contest in Modeling (MCM) 2020 Nov. 2019 – Mar. 2020

Establishing receptor polarity in the zebrafish posterior lateral line primordium (poster) October 2017

Society for Advancement of Chicanos/Hispanics and Native Americans in Science
Poster session for potential future graduate students

The princess problem and extensions January 2016
Graduate Student Advisory Committee (Mathematics)

Modeling development of the zebrafish lateral line October 2014
Mathematical Modeling in Health Sciences lightning talks

Graduate Coursework

- Numerical analysis
- Functional & complex analysis
- Mathematical biology
- Ordinary & partial differential equations
- Perturbation methods
- Stochastic processes