Alex Kruckman

CONTACT INFORMATION	Department of Mathematics and Computer Science
	Wesleyan University
	265 Church Street
	Middletown, CT 06459
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		`akruckman@wesleyan.edu`
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		`https://akruckman.faculty.wesleyan.edu`

EMPLOYMENT

Assistant Professor, Wesleyan University, July 2019 – present.

Zorn Postdoctoral Fellow, Indiana University Bloomington, August 2016 – May 2019.

EDUCATION

University of California, Berkeley, August 2010 – May 2016
PhD, Mathematics, May 2016
Thesis: *Infinitary Limits of Finite Structures*
Advisor: Thomas Scanlon

Brown University, August 2006 – May 2010
ScB with honors, Mathematics, 2010
Dual concentration in Music (Computer Music & Multimedia track)

PREPRINTS

Invariant measures in simple and in small theories (with Artem Chernikov, Ehud Hrushovski, Krzysztof Krupinski, Slavko Moconja, Anand Pillay, and Nicholas Ramsey). Submitted. (arXiv)

Properly ergodic structures (with Nathanael Ackerman, Cameron Freer, and Rehana Patel). (arXiv)

Interpolative fusions II: Preservation results (with Minh Chieu Tran and Erik Walsberg). (arXiv)

ACCEPTED MANUSCRIPTS

Examples of weak amalgamation classes (with Adam Krawczyk, Wiesław Kubiś, and Aristotelis Panagiotopoulos). To appear in Mathematical Logic Quarterly. (arXiv)

PEER REVIEWED PUBLICATIONS

13. *The almost sure theory of finite metric spaces* (with Isaac Goldbring and Bradd Hart), Bulletin of the London Mathematical Society, Volume 53, Issue 6, December 2021, pp. 1740-1748. (arXiv)

12. *Exploring the landscape of relational syllogistic logic* (with Lawrence S. Moss), The Review of Symbolic Logic, Volume 14, Issue 3, September 2021, pp. 728-765. (arXiv)

11. *Higher dimensional obstructions for star reductions* (with Aristotelis Panagiotopoulos), Fundamenta Mathematicae, Volume 255, Number 2, 2021, pp. 209-230. (arXiv)

10. *Interpolative fusions* (with Chieu-Minh Tran and Erik Walsberg). Journal of Mathematical Logic, Volume 21, Issue 2, August 2021, Article No. 2150010. (arXiv)

9. *Tameness in least fixed-point logic and McColm's conjecture* (with Siddharth Bhaskar), Logical Methods in Computer Science, Volume 17, Issue 1, January 2021. (arXiv)

8. *Logics for sizes with union or intersection* (with Caleb Kisby, Saúl A. Blanco, and Lawrence S. Moss), presented at AAAI-20 (Thirty-Fourth AAAI Conference on Artificial Intelligence), February 2020, New York, NY. (pdf)

7. *Independence in generic incidence structures* (with Gabriel Conant), Journal of Symbolic Logic, Volume 84, Issue 2, June 2019, pp. 750-780. (arXiv)

6. *Disjoint n-amalgamation and pseudofinite countably categorical theories*, Notre Dame Journal of Formal Logic, Volume 60, Number 1 (2019), pp. 139–160. (arXiv)

5. *Generic expansion and Skolemization in $NSOP_1$ theories* (with Nicholas Ramsey), Annals of Pure and Applied Logic, Volume 169, Issue 8, August 2018, pp. 755–774. (arXiv)

4. *All and Only* (with Lawrence S. Moss), in *Partiality and Underspecification in Information, Languages, and Knowledge*, ed. Henning Christiansen, M. Dolores Jiménez-López, Roussanka Loukanova, and Lawrence S. Moss. Cambridge Scholars Publishing, 2017, pp. 189–218. (pdf)

3. *Actions arising from intersection and union* (with Lawrence Valby), Journal of Logic, Language and Information, Volume 25, Issue 2, June 2016, pp. 139–161. (arXiv)

2. *A Myhill-Nerode theorem for automata with advice* (with Sasha Rubin, John Sheridan, and Ben Zax), in *Proceedings GandALF 2012*, ed. Marco Faella and Aniello Murano, EPTCS Volume 96, 2012, pp. 238–246. (arXiv)

1. *Chains of probability distributions and Benford's Law* (with Dennis Jang, Jung Uk Kang, Jun Kudo, and Steven J. Miller), Journal of Algebra, Number Theory: Advances and Applications, Volume 1, Number 1, March 2009, pp. 37–60. (arXiv)

OTHER MANUSCRIPTS

This section lists writing I have done that is not intended for publication in its current form: My undergraduate and PhD theses, expository notes and lecture notes for teaching purposes, and notes on original reseach which has not yet made it into a paper.

11. *A surprising instance of dividing* (with Gabriel Conant), research note, 2021. (pdf)

10. *Generalized indiscernibles from ultrafilters*, research note, 2020. (pdf)

9. *Model theory of the real numbers*, lecture notes for a graduate course at Wesleyan, Spring 2020. (pdf)

8. *Model theory*, lecture notes for graduate course at IU, Fall 2018. (pdf)

7. *Forking and dividing with free amalgamation* (with Gabriel Conant), research note, 2017. (pdf)

6. *Presenting finitary functors*, expository note, 2017. (pdf)

5. *Infinitary limits of finite structures*, PhD thesis, UC Berkeley, May 2016. (pdf)

4. *Notes on ultrafilters*, expository note, 2012. (pdf)

3. *Notes on the stability spectrum*, expository note, 2012. (pdf)

2. *An elementary proof of the Markov Chain Tree Theorem* (with Amy Greenwald and John Wicks), expository note, 2010. (pdf)

1. *The Ax-Kochen Theorem: An application of model theory to algebra*, undergraduate honors thesis, 2010. (arXiv)

GRANTS AND AWARDS

5. **Max Zorn Teaching Award**, IU Mathematics, 2018-2019.

4. **Department Research Fellowship**, Berkeley Mathematics, Spring 2014.

3. **Outstanding Graduate Student Instructor Award**, Berkeley Mathematics, 2011-2012.

2. **NSF Graduate Research Fellowship Honorable Mention**, 2011.

1. **NSF Graduate Research Fellowship Honorable Mention**, 2010.

TALKS

49. *Properly ergodic structures*, IPM Logic Webinar, November 2021, Tehran, Iran (via Zoom).

48. *A continuous zero-one law for finite metric spaces*, IU Logic Seminar, October 2021, Bloomington, IN.

47. *Higher dimensional obstructions for star reductions*, Association for Symbolic Logic North American Meeting (invited talk), June 2021, South Bend, IN (via Zoom).

46. *A continuous zero-one law for finite metric spaces*, Seminario Flotante de Lógica, March 2021, Bogotá, Colombia (via Zoom).

45. *A continuous zero-one law for finite metric spaces*, University of Manchester Logic Seminar, March 2021, Manchester, UK (via Zoom).

44. *Higher dimensional obstructions for star reductions* , South Eastern Logic Symposium 2021 (invited talk), February 2021, Gainesville, FL (via Zoom).

43. *Interpolative fusions*, IPM Mathematical Logic Seminar, July 2020, Tehran, Iran (via Zoom).

42. *The complexity of "natural logic"*, Wesleyan NSM Lunch, Feburary 2020, Middletown, CT.

41. *A diversity of Kim's lemmas*, UMD Logic Seminar, February 2020, College Park, MD.

40. *Obstructions for star reductions*, Wesleyan Topology Et Al Seminar, February 2020, Middletown, CT.

39. *A diversity of Kim's Lemmas*, CUNY Model Theory Seminar, November 2019, New York, NY.

38. *Interpolative fusions*, CUNY Logic Workshop, November 2019, New York, NY.

37. *Combinatorial tameness in least fixed-point logic*, IU Logic Seminar, October 2019, Bloomington, IN.

36. *Interpolative fusions*, Model Theory Special Session, AMS Fall Central Sectional Meeting (invited talk), September 2019, Madison, WI.

35. *Interpolative fusions*, Model Theory Session, Association for Symbolic Logic North American Meeting (invited talk), May 2019, New York, NY.

34. *Interpolative fusions*, Wesleyan University Mathematics Colloquium, January 2019, Middletown, CT.

33. *Interpolative fusions*, OSU Logic Seminar, January 2019, Columbus, OH.

32. *Interpolative fusions*, IU Logic Seminar, November 2018, Bloomington, IN.

31. *Interpolative fusions*, BIRS Neostability Theory workshop, Casa Matemática Oaxaca, October 2018, Oaxaca, Mexico.

30. *Interpolative fusions: preservation results*, UIUC Logic Seminar, May 2018, Champaign, IL.

29. *The convergence of three notions of limit for finite structures*, Workshop on model theory of finite and pseudofinite structures / University of Leeds Logic Colloquium (invited talk), April 2018, Leeds, UK.

28. *The convergence of three notions of limit for finite structures*, IU Logic Seminar, April 2018, Bloomington, IN.

27. *Independence in generic expansions and fusions*, UCLA Logic Seminar, March 2018, Los Angeles, CA.

26. *Independence in generic expansions and fusions*, UMD Logic Seminar, February 2018, College Park, MD.

25. *All and Only* (2 talks), IU Logic Seminar, January 2018.

24. *Generic theories, independence, and NSOP$_1$*, 2017 CMS Winter Meeting (invited talk), December 2017, Waterloo, ON.

23. *Generic theories, independence, and NSOP$_1$*, Mid-Atlantic Mathematical Logic Seminar (MAMLS) Conference (invited talk), October 2017, Wesleyan, CT.

22. *First-order logic and cologic over a category*, Wesleyan Mathematics Colloquium, October 2017, Wesleyan, CT.

21. *Independence in generic structures*, IU Logic Seminar, October 2017, Bloomington, IN.

20. *Independence in generic structures*, Purdue Logic Seminar, October 2017, West Lafayette, IN.

19. *First-order cologic for profinite structures*, BLAST 2017 (contributed talk), August 2017, Nashville, TN.

18. *First-order cologic for profinite structures*, TACL 2017 (contributed talk), June 2017, Prague, Czechia.

17. *Generic expansion and Skolemization in NSOP$_1$ theories*, UW Logic Seminar, April 2017, Madison, WI.

16. *First-order logic for LFP categories and their duals*, Notre Dame Mathematical Logic Seminar, March 2017, South Bend, IN.

15. *Foundations of cologic*, IU Logic Seminar, January 2017, Bloomington, IN.

14. *Foundations of cologic*, CUNY Model Theory Seminar, December 2016, New York, NY.

13. *Foundations of cologic*, UIUC Logic Seminar, November 2016, Champaign, IL.

12. *Foundations of cologic*, Midwest Model Theory Day (invited talk), November 2016, UIC, Chicago, IL.

11. *Properly ergodic structures* (2 talks), IU Logic Seminar, September 2016.

10. *Properly ergodic structures*, McMaster Model Theory Seminar, February 2016, Hamilton, Ontario.

9. *Properly ergodic structures*, Waterloo Logic Seminar, February 2016, Waterloo, Ontario.

8. *Properly ergodic structures*, UCLA Logic Seminar, January 2016, Los Angeles, CA.

7. *Pseudofinite countably categorical theories*, Model Theory Special Session, AMS Fall Central Sectional Meeting (invited talk), October 2015, Chicago, IL.

6. *Properly ergodic random structures*, Workshop on Logic and Random Graphs (contributed talk), September 2015, Lorentz Center, Leiden, Netherlands.

5. *Properly ergodic random structures*, BLAST 2015 (contributed talk), June 2015, University of North Texas, Denton, TX.

4. *Properly ergodic random structures*, University of Leeds Model Theory Seminar, April 2015, Leeds, UK.

3. *Amalgamation and the finite model property*, Association for Symbolic Logic North American Meeting (contributed talk), March 2015, Urbana, IL.

2. *Sampling measures and limits of finite structures*, Association for Symbolic Logic North American Meeting (contributed talk), May 2014, Boulder, CO.

1. *Sampling measures*, Graduate Student Logic Conference XV (contributed talk), April 2014, Madison, WI.

Many talks in Berkeley seminars during graduate school: Model Theory Seminar, Student Logic Colloquium, Many Cheerful Facts, etc. 2010 – 2016.

TEACHING   **Wesleyan University:**

Spring 2022	Math 223 - Linear Algebra
	Math 526 - Graduate Topics: Stability and Categoricity
	Math 502 - Graduate Tutorial: Categorical Logic
	Math 402 - Undergraduate Tutorial (for honors): Ramsey theory
Fall 2021	Math 122 - Calculus II
	Math 261 - Abstract Algebra (Groups, Rings, and Fields)
	Math 501 - Graduate Tutorial: NIP Theories
Summer 2021	Undergraduate Research / Reading Course: Model theory and ultraproducts
Spring 2021	Math 223 - Linear Algebra
	Math 544 - Graduate Algebra I (Commutative Algebra)
	Math 502 - Graduate Tutorial: Hyperimaginaries in Simple Theories
Spring 2020	Math 262 - Abstract Algebra (Galois Theory)
	Math 509 - Model Theory (Model theory of the real numbers)
Fall 2019	Math 121 - Calculus I
	Math 261 - Abstract Algebra (Groups, Rings, and Fields)

Indiana University:

Spring 2019	Math 782 - Topics in Mathematical Logic: Categorical Logic
Fall 2018	Math 118 - Finite Mathematics Math 682 - Model Theory
Spring 2018	Math 583 - Set Theory
Fall 2017	Math 118 - Finite Mathematics
Spring 2018	Math 120 - Brief Survey of Calculus II Math 499 - Reading for Honors (Uncountably Categorical Theories)
Fall 2016	Math 118 - Finite Mathematics

UC Berkeley (Instructor):

Summer 2015	Math 54 - Linear Algebra & Differential Equations
Fall 2013	Math 32 - Precalculus
Summer 2013	Math 113 - Abstract Algebra
Spring 2013	Math 32 - Precalculus
Fall 2012	Math 32 - Precalculus
Summer 2011	Math 54 - Linear Algebra & Differential Equations

UC Berkeley (Teaching Assistant):

Spring 2016	Math 110 - Linear Algebra
Fall 2014	Math 110 - Linear Algebra
Spring 2012	Math 32 - Precalculus
Fall 2011	Math 53 - Multivariable Calculus
Spring 2011	Math 1B - Calculus II
Fall 2010	Math 1A - Calculus I

Brown University (Undergraduate Teaching Assistant):

Fall 2009	CS 19 - Accelerated Introduction to Programming
Spring 2009	CS 18 - Introduction to Programming, Head TA
Fall 2008	CS 17 - Introduction to Programming, Head TA
Spring 2008	CS 18 - Introduction to Programming
Fall 2007	CS 17 - Introduction to Programming

SERVICE

4. **DADCOM** (Departmental Advisory Committee), Fall 2021 – Spring 2022.

3. **Department Secretary**, Spring 2021. Prepared minutes for department meetings.

2. **Wesleyan NSM Lunch** talk, February 2020. This was a talk on my research (*The complexity of "natural logic"*) for the natural sciences and math faculty at Wesleyan.

1. Faculty Advisor, **Wesleyan Math Club**, 2019-2020. The math club held regular discussion meetings, organized a SET tournament, and hosted a panels on undergraduate research opportunities and a talk on undergraduate research by Professor Ralph Morrison from Williams College. A planned field trip to the Museum of Mathematics in New York was cancelled due to COVID-19.

6. Mentor, IU Mathematics **Research Experiences for Undergraduates** (REU) program, Summer 2018. Worked with MIT undergraduate student Matisse Peppet on the topic of incidence structures and model theory. The project produced publishable work, but the paper is still in preparation.

5. Program committee member, **Workshop on Logic, Language, Information and Computation** (WoLLIC) 2018.

4. **IU Mathematics Colloquium Committee**, Fall 2017.

3. Instructor and curriculum designer, **WonderCamp** Math and Games summer camp, a summer camp for students entering 4th-6th grades, WonderLab Museum of Science, Health & Technology, Bloomington, IN, July 2017.

2. Organizer, **AMS Special Session** on Computability and Inductive Definability over Structures, AMS Spring Central Sectional Meeting, Bloomington, IN, April 2017.

1. **Reviewer:** AMS Mathematical Reviews, Archive for Mathematical Logic, Bulletin of the London Mathematical Society, Journal of Combinatorial Theory Series B, Journal of Mathematical Logic, Logical Methods in Computer Science, Model Theory, Notre Dame Journal of Formal Logic, Random Structures and Algorithms.