

Alexander B. Kunin · Curriculum Vitae

Department of Mathematics
Creighton University
2500 California Plaza
Omaha, NE 68178

email: alexkunin@creighton.edu
office: (402) 280-2582

Updated February 8, 2024

Education and Employment

Employment	Creighton University Department of Mathematics Assistant Professor	Omaha, NE Jan 2023 –
	Baylor College of Medicine, University of Houston Postdoctoral Fellow <i>Mentors: Xaq Pitkow (BCM), Krešimir Josić (UH)</i>	Houston, TX Sep 2019 – Dec 2022
Education	Pennsylvania State University Ph.D. in Mathematics <i>Dissertation: Properties and Applications of Convex Neural Codes</i> <i>Adviser: Vladimir Itskov</i>	State College, PA Aug 2014 – Aug 2019
	University of Nebraska – Lincoln M.S. in Mathematics	Lincoln, NE Aug 2012 – May 2014
	University of Alabama in Huntsville M.S. in Computer Science <i>Thesis: Self-Stabilizing Algorithms for Independence, Domination, and Coloring</i> <i>Adviser: Pete Slater</i>	Huntsville, AL Aug 2010 – Aug 2012
	Stony Brook University B.S. in Mathematics, minor in Computer Science	Stony Brook, NY Sep 2006 – May 2010
Additional	Neuromatch Academy Online Course 2020	July 2020
	Center for Brains, Minds, and Machines Summer Course 2017	Aug 2017 Woods Hole, MA
	Allen Institute for Brain Science Summer Workshop on the Dynamic Brain	Aug 2016 Friday Harbor, WA

Fellowships and Awards

National Library of Medicine Biomedical Informatics and Data Science Training Fellowship <i>Included funding to pursue proposed project and curriculum of graduate courses and professional training in biomedical informatics and data science.</i>	Jan 2021 – Dec 2022
---	---------------------

Publications

- Preprints**
- NEURD: A mesh decomposition framework for automated proofreading and morphological analysis of neuronal EM reconstructions.**
 B. Celii, S. Papadopoulos, Z. Ding, P. G. Fahey, E. Wang, C. Papadopoulos, A. B. Kunin, S. Patel, J. A. Bae, ..., X. Pitkow, A. S. Tolias, J. Reimer. (2023)
In revision.
<https://www.biorxiv.org/content/10.1101/2023.03.14.532674v1>
- Functional connectomics of mouse visual cortex reveals organization of synaptic connections.**
 Z. Ding, P. G. Fahey, S. Papadopoulos, E. Wang, B. Celii, C. Papadopoulos, A. B. Kunin, J. Fu, Z. Ding, S. Patel, MICrONS Consortium, H. S. Seung, F. Collman, N. Maçarico da Costa, R. C. Reid, E. Y. Walker, X. Pitkow, J. Reimer, A. S. Tolias. (2023)
In revision.
<https://www.biorxiv.org/content/10.1101/2023.03.13.531369v1>
- Published**
- Hierarchical Modular Structure of the Drosophila Connectome.**
 A. B. Kunin, J. Guo, K. Josić, X. Pitkow, K. E. Bassler. (2023)
Journal of Neuroscience. Featured as cover story
<https://www.jneurosci.org/content/43/37/6384?iss=37>
- Oriented Matroids and Combinatorial Neural Codes.**
 A. B. Kunin, C. Lienkaemper, Z. Rosen. (2023)
Combinatorial Theory, Volume 3, Issue 1.
<https://escholarship.org/uc/item/00c6r759>
- Hyperplane neural codes and the polar complex.**
 V. Itskov, A. B. Kunin, Z. Rosen. (2020)
Appears in Topological Data Analysis: The Abel Symposium 2018
<https://arxiv.org/abs/1801.02304>

Software Packages

- Julia**
- ERGM.jl.** <https://github.com/sekunder/ergm.jl>
Julia package for sampling and parameter estimation in Exponential Random Graphs. Under development.
- Simplicial.jl.** <https://github.com/nebneuron/Simplicial.jl>
Julia Package for combinatorial algebraic topology and topological data analysis. Contributed combinatorial code functionality, documentation, tests.
- BinaryVectorProbability.jl.** <https://github.com/sekunder/BinaryVectorProbability.jl>
(Deprecated) Types and functions for representing probability distributions on $\{0,1\}^n$ and fitting parameters.

Research Presentations

- Invited Talks**
- | | |
|---|----------|
| AMS Special Session on Applied Commutative Algebra | Apr 2024 |
| Boston College Mathematics and Machine Learning Seminar | Oct 2021 |

	SIAM Conference on Applied Algebraic Geometry – Minisymposium on Algebraic & Geometric Methods in Neural Coding	Aug 2021
	SIAM Texas-Louisiana Section Meeting	Nov 2019
	SIAM Conference on Applied Algebraic Geometry – Minisymposium on Algebraic & Combinatorial Methods in Neural Coding	July 2019
	AMS Spring Sectional Meeting – Special Session on Al- gebraic and Discrete Methods in Mathematical Biology	Mar 2019
	AMS Fall Sectional Meeting – Special Session on Applied Algebraic Topology	Sept 2018
Other Talks	Neuromatch Conference 3.0 <i>Receptive field geometry shapes information content of the neural code</i>	Oct 2020
	Algebra and Combinatorics Seminar, Texas A&M U. <i>Hyperplane codes and the polar complex</i>	Feb 2018
	Joint Mathematics Meetings <i>Hyperplane neural codes and the polar complex</i>	Jan 2018
	International Conference on Mathematical Neuroscience <i>Low dimensional geometry of stimuli shapes the information content of a neural code</i>	Jun 2017
	Discrete Math Seminar, U. Nebraska – Lincoln <i>Building Simplicial Complexes from Neural Data</i>	Feb 2017
	Masters Thesis Defense, UAH <i>Self-Stabilizing Algorithms for Independence, Domination, and Coloring</i>	Aug 2012
Posters	COSYNE Main Meeting <i>Hierarchical Modular Structure of the Drosophila Connectome</i>	Mar 2023
	COSYNE Main Meeting <i>Low dimensional geometry of stimuli shapes the information content of a neural code</i>	Feb 2017
Service		
Service	Organizer, AMS Special Session on Discrete, Algebraic, and Topological Methods in Mathematical Biology	Oct 2023
	Organizer, Computational Neuroscience Journal Club	Fall 2018 - Spring 2019
	Penn State Math Dept. Diversity Workshop Planning Committee	Fall 2016
	UNL Graduate Student Advisory Board	Fall 2012 – Spring 2014

Teaching

Creighton	Business Statistics	Spring 2024
	Calculus I	–
	Introduction to Abstract Mathematics	–
	Business Statistics	Fall 2023
	Math for the Modern World	–
	Calculus III	–
	Math in Medicine and Life Sci.	Spring 2023
Penn State	Calculus I	–
	Vector Calculus	Spring 2019
	Finite Mathematics (2 sections)	Fall 2015
	College Algebra I	Spring 2015
UNL	Contemporary Mathematics	Spring 2014
	College Algebra (2 sections)	Fall 2013
	Calculus II Recitation (2 sections)	Spring 2013
	Calculus I Recitation (2 sections)	Fall 2012
Hampshire College	Junior staff, Hampshire College Summer Studies in Mathematics	Summer 2011-13