Alexander Nicholas Sietsema

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Research Interests

Numerical Linear Algebra, Optimization, Machine Learning, Data Science, Applications.

Citizenship

USA

Education

Ph.D., Computational and Applied Mathematics (in progress) — 2022 – present
University of California, Los Angeles — Los Angeles, CA
Advanced to candidacy — Fall 2024

M.A., Computational and Applied Mathematics — 2022 – 2024
University of California, Los Angeles — Los Angeles, CA

B.S., Advanced Mathematics; B.S., Computational Mathematics — 2018 – 2022
Michigan State University — East Lansing, MI
Dual-enrolled during high school — 2017 – 2018

Lansing Community College — Lansing, MI
Dual-enrolled during high school — 2016 – 2017

Publications

* indicates equal contribution

Journal Publications

1. Benjamin Jarman, Lara Kassab, Deanna Needell, **Alexander Sietsema** - *"Stochastic Iterative Methods for Online Rank Aggregation from Pairwise Comparisons."* BIT Numerical Mathematics vol. 64, 2024. https://link.springer.com/article/10.1007/s10543-024-01024-x

2. Rachel Domagalski, Jinting Liang, Quinn Minnich, Bruce E. Sagan, Jamie Schmidt, **Alexander Sietsema** - *"Cyclic Shuffle Compatibility."* Séminaire Lotharingien de Combinatoire, vol. 85, 2021. https://www.mat.univie.ac.at/~slc/wpapers/s85domasaga.pdf

3. Rachel Domagalski, Sergi Elizalde, Jinting Liang, Quinn Minnich, Bruce E. Sagan, Jamie Schmidt, **Alexander Sietsema** - *"Cyclic Pattern Containment and Avoidance."* Advances in Applied Mathematics, vol. 135, 2022. https://www.sciencedirect.com/science/article/abs/pii/S019688582200001X

4. Domagalski, Jinting Liang, Quinn Minnich, Bruce E. Sagan, Jamie Schmidt, **Alexander Sietsema** - *"Pinnacle Set Properties, 2021."* Discrete Mathematics, vol. 345, iss. 7, 2022. https://www.sciencedirect.com/science/article/abs/pii/S0012365X22000887

Conference Publications

1. Kedar Karhadkar*, **Alexander Sietsema***, Deanna Needell, Guido Montufar - *"Harmful Overfitting in Sobolev Spaces"* (Submitted). https://arxiv.org/abs/2602.00825

2. David R Johnson, **Alexander Sietsema**, Rishabh Anand, Deanna Needell, Smita Krishnaswamy, Michael Perlmutter - *"VDW-GNNs: Vector diffusion wavelets for geometric graph neural networks"* (Submitted).

3. **Alexander Sietsema***, Zerrin Vural*, James Chapman, Yotam Yaniv, Deanna Needell - *"Stratified Non-Negative Tensor Factorization."* Proc. 58th Asilomar Conf. on Signals, Systems and Computers, Pacific Grove, CA, 2024. https://ieeexplore.ieee.org/document/10942969

4. **Alexander N. Sietsema**, Michael T. McCann, Marc L. Klasky, Saiprasad Ravishankar - *"Comparing One-step and Two-step Scatter Correction And Density Reconstruction In X-Ray CT."* 7th International Conference on Image Formation in X-Ray Computed Tomography, vol. 12304, 2022. https://www.spiedigitallibrary.org/conference-proceedings-of-spie/12304/2647151/Comparing-one-step-and-two-step-scatter-correction-and-density/10.1117/12.2647151.full?SSO=1

Teaching Experience

Python With Applications II (PIC 16B) Teaching Assistant Spring 2023 – Winter 2026
Wrote discussion materials, led discussion sessions, evaluated student projects.

Python With Applications I (PIC 16A) Teaching Assistant Fall 2022, Winter 2023, Spring 2024
Wrote discussion materials, led discussion sessions, graded exams, led study sessions.

Honors Linear Algebra (MTH 317H) Undergraduate Learning Assistant Fall 2021
Led recitation sessions, graded homeworks and exams, led study sessions, held LaTeX learning sessions.

Calculus I (MTH 132) Course Assistant Spring 2020
Answered questions on Piazza, led biweekly help sessions for students, graded exams.

Calculus II (MTH 133) Undergraduate Learning Assistant Fall 2019
Supervised two sections, led recitations sessions, led special review sessions, graded labs, quizzes, and exams.

Presentations

Conference Oral Presentations

1. **"Stratified Non-Negative Tensor Factorization"**, 58th Asilomar Conf. on Signals, Systems, and Computers, Pacific Grove, CA, Oct. 2024.

Invited Seminars

1. **"Harmful Overfitting in Sobolev Spaces"**, Michigan State University Applied Mathematics Seminar, April 2026 (scheduled).

Posters

1. **"Stochastic Iterative Methods for Online Rank Aggregation from Pairwise Comparisons"**, 2nd Conf. on Random Matrix Theory and Numerical Linear Algebra, Seattle, WA, June 2025

2. **"Stratified Non-Negative Tensor Factorization"**, Workshop: Approximation And Learning In High Dimensions, Centre de Recherches Mathématiques, Montreal, QC, Canada, June 2025.

3. **"Stochastic Iterative Methods for Online Rank Aggregation from Pairwise Comparisons"**, Research in the Age of AI Symposium, Los Angeles, CA, Feb. 2024.

4. **"Comparing One-Step and Two-Step Descattering and Reconstruction"**, CT Meeting 2022, Baltimore, MD, June 2022.

5. **"Comparing One-Step and Two-Step Descattering and Reconstruction"**, MSU CMSE Student Research Symposium, East Lansing, MI, May 2022.

6. **"An Algorithm For Counting Admissible Pinnacle Orderings"**, Permutation Patterns 2021 (Univ. of Strathclyde Combinatorics Group), June 2021.

7. **"Pattern Avoidance in Cyclic Permutations"**, Joint Mathematics Meetings Poster Session, Jan. 2021.
8. **"A Cyclic Variant of the Erdős-Szekeres Theorem"**, Joint Mathematics Meetings Poster Session, Jan. 2021.
9. **"Pattern Avoidance in Cyclic Permutations"**, JMU SUMS Poster Session, Dec. 2020.
10. **"A Cyclic Variant of the Erdős-Szekeres Theorem"**, JMU SUMS Poster Session, Dec. 2020.

Honors

Outstanding Poster 2021
Joint Mathematics Meetings Poster Session, "Pattern Avoidance in Cyclic Permutations"

Honorable Mention Poster 2021
Joint Mathematics Meetings Poster Session, "A Cyclic Variant of the Erdős-Szekeres Theorem"

Herbert T. Graham Scholarship 2020, 2021, 2022
Department of Mathematics Award

Paul and Wilma Dressel Endowed Scholarship 2019
Department of Mathematics Award

FAITH Endowment Scholarship for Academic Excellence 2018 – 2022
Endowment for Greek Orthodoxy and Hellenism

Dr. Helene Tzitsikas Education Scholarship 2018
Holy Trinity Greek Orthodox Church Parish Award

Michigan State University Alumni Distinguished Freshman 2018 – 2022
University full-tuition scholarship

Dean's List 2018 – Present
(all undergraduate semesters)

Additional Projects

Scripps National Spelling Bee Spring 2024
(Subject to NDA)
Analysis of word list difficulty leveling and in-competition word selection.

Honors Senior Thesis Spring 2022
Advisor: Albert Cohen
Exploring game theoretic properties and theorems for an novel stochastic variant of the classical subtraction game, including optimal move selection and conditions for excluding available moves, with applications to sports analytics.

Projects in Industrial Mathematics Spring 2022
Advisor: Peiru Wu
Creating a data handling pipeline for hospital Medicare and Medicaid cost reports, as well as investigating trends in those reports. Industry project with The Rybar Group.

MSU Risk Management and Sports Analytics Group Fall 2021
Advisor: Albert Cohen
Developing new methods for optimal decision making for two-point conversion attempts in American football; analyzing the effects of fights in hockey on the outcomes of games.

UCLA Computational and Applied Mathematics REU Summer 2021
Advisor: Jamie Haddock
Exploring Kaczmarz methods for inconsistent and corrupted linear systems and their connections to maximum likelihood estimation techniques for ranking sports teams.

Extracurricular Activities

UCLA Math Department Ultimate Frisbee (2022 – 2025) | Organizer
MSU Math Department Ultimate Frisbee (2018 - 2022) | Organizer
Phantom Regiment Drum and Bugle Corps (2019) | Euphonium, small ensemblist
2019 Drum Corps International World Class Championship Finalist

Interests: Escape rooms, music, cooking, hiking, ultimate frisbee, euchre, hockey, college football