Alexander Nicholas Sietsema

East Lansing, MI | alexsietsema@ucla.edu | 517-993-7582
https://www.alexsietsema.com
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Research Interests

Numerical Linear Algebra, Optimization, Machine Learning, Algorithmic Interpretability, Data Science, Game theory, Applications.

Education

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

Michigan State University — East Lansing, MI
B.S. Advanced Mathematics, B.S. Computational Mathematics — 2018 – 2022
Cumulative GPA: 3.92, Major GPA: 3.91
Dual-enrolled during high school — 2017 – 2018

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

Publications

1. 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

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

Research Experience

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.

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.

Appelö High Order Group — Fall 2021
Advisor: Daniel Appelö
Developing and analyzing computational tools for quantum computing applications.

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.

Department of Mathematics Exchange Program Spring 2021
Advisor: Ekaterina Rapinchuk
Exploring methods and tools for semi-supervised learning and graph-based learning.

Combinatorics Research Fall 2020 – Summer 2021
Advisor: Bruce Sagan
Proving new results on shuffle sets, permutation statistics, and pattern avoidance for cyclic permutations.

MSU Signals, Learning, and Imaging Group Spring 2020 – Spring 2022
Advisor: Saiprasad Ravishankar
Investigating algorithms for correcting scattering artifacts in MeV tomography measurements in collaboration with researchers at Los Alamos National Laboratories. Additionally, considering data-driven algorithms to solve compressed sensing problems.

Teaching Experience

Python With Applications II Teaching Assistant Spring 2023
Wrote discussion materials, led discussion sessions, evaluated student projects.

Python With Applications I Teaching Assistant Fall 2022, Winter 2023
Led discussion sessions, graded exams, led study sessions.

Honors Linear Algebra Undergraduate Learning Assistant Fall 2021
Led recitation sessions, graded homeworks, tests, exams, led study sessions, held LaTeX learning sessions.

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

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

Presentations / Posters

Conference / Poster Presentations

Comparing One-Step and Two-Step Descattering and Reconstruction June 2022
CT Meeting 2022, CMSE Department Student Research Symposium

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

Semi-Supervised Learning April 2021
Michigan State University Undergraduate Research and Arts Forum

Pattern Avoidance in Cyclic Permutations January 2021
Joint Mathematics Meetings Poster Session, JMU SUMS Poster Session

A Cyclic Variant of the Erdős-Szekeres Theorem January 2021
Joint Mathematics Meetings Poster Session, JMU SUMS Poster Session

Pattern Avoidance in Cyclic Permutations November 2020
SUMS Conference at James Madison University

Seminar Presentations

A Stochastic Subtraction Game March 2022
MSU Risk Management and Sports Analytics Group presentation

Optimizing Point-After Attempt Strategies for College Football December 2021
MSU Risk Management and Sports Analytics Group presentation

One-Step and Two-Step Descattering October 2021
Signals, Learning, and Imaging Group presentation

Kaczmarz Methods and Best Linear Unbiased Estimators September 2021
Signals, Learning, and Imaging Group presentation

Pattern Avoidance in Cyclic Permutations January 2021
Department of Mathematics Graduate And Undergraduate Student Seminar

Nearest-Neighbor Sampling Densities and Descattering Performance December 2020
Signals, Learning, and Imaging Group presentation

Iterative Methods for Descattering September 2020
Signals, Learning, and Imaging Group presentation

Descattering with a Gaussian Kernel July 2020
Signals, Learning, and Imaging Group presentation

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)

Technical Skills

Languages: Python, Matlab, R, LaTeX, Julia, C++, C#
Libraries: Pandas, NumPy, itertools, Matplotlib, Seaborn, Plotly, scikit-learn, SciPy, Statsmodels, BeautifulSoup, Requests, Selenium, Scrapy, Tensorflow, Keras, PyTorch, Anaconda

Extracurricular Activities

MSU Math Department Ultimate Frisbee (2018-2022) | Organizer
Phantom Regiment Drum and Bugle Corps (2019) | Euphonium player and small ensemble member
2019 Drum Corps International World Class Championship Finalist
Michigan State University Spartan Marching Band (2018) | Baritone player
Legends Drum and Bugle Corps (2018) | Baritone player
2018 Drum Corps International Open Class Championship Finalist