

ALEXANDER NICHOLAS SIETSEMA

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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 (ICIFXCT 2022), 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?SS0=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**Introduction to Python Teaching Assistant**

Fall 2022

*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***Comparing One-Step and Two-Step Descattering and Reconstruction**

November 2021

*Department of CMSE 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 <i>MSU Risk Management and Sports Analytics Group presentation</i>	March 2022
Optimizing Point-After Attempt Strategies for College Football <i>MSU Risk Management and Sports Analytics Group presentation</i>	December 2021
One-Step and Two-Step Descattering <i>Signals, Learning, and Imaging Group presentation</i>	October 2021
Kaczmarz Methods and Best Linear Unbiased Estimators <i>Signals, Learning, and Imaging Group presentation</i>	September 2021
Pattern Avoidance in Cyclic Permutations <i>Department of Mathematics Graduate And Undergraduate Student Seminar</i>	January 2021
Nearest-Neighbor Sampling Densities and Descattering Performance <i>Signals, Learning, and Imaging Group presentation</i>	December 2020
Iterative Methods for Descattering <i>Signals, Learning, and Imaging Group presentation</i>	September 2020
Descattering with a Gaussian Kernel <i>Signals, Learning, and Imaging Group presentation</i>	July 2020

HONORS

Outstanding Poster <i>Joint Mathematics Meetings Poster Session, "Pattern Avoidance in Cyclic Permutations"</i>	2021
Honorable Mention Poster <i>Joint Mathematics Meetings Poster Session, "A Cyclic Variant of the Erdős-Szekeres Theorem"</i>	2021
Herbert T. Graham Scholarship <i>Department of Mathematics Award</i>	2020, 2021, 2022
Paul and Wilma Dressel Endowed Scholarship <i>Department of Mathematics Award</i>	2019
FAITH Endowment Scholarship for Academic Excellence <i>Endowment for Greek Orthodoxy and Hellenism</i>	2018 – 2022
Dr. Helene Tzitsikas Education Scholarship <i>Holy Trinity Greek Orthodox Church Parish Award</i>	2018
Michigan State University Alumni Distinguished Freshman <i>University full-tuition scholarship</i>	2018 – 2022
Dean's List <i>(all undergraduate semesters)</i>	2018 – Present

TECHNICAL SKILLS

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

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