Alexander Nicholas Sietsema

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Education

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

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

Research Experience

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 - Present
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
Developing fast semi-supervised data classification algorithms using global minimization of graph-based optimization problems via novel modified maximum flow frameworks formed using a similarity graph.

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 – Present
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.

Publications

1. Alexander N. Sietsema, Michael T. McCann, Marc L. Klasky, Saiprasad Ravishankar - Comparing One-Step and Two-Step Descattering and Density Reconstruction in X-Ray CT, 2021. *(Submitted to IEEE ICASSP 2022).* `https://arxiv.org/abs/2110.08326`

2. Rachel Domagalski, Jinting Liang, Quinn Minnich, Bruce E. Sagan, Jamie Schmidt, Alexander Sietsema - "Cyclic Shuffle Compatibility." Sém. Lothar. Combin., 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, 2021. *(Submitted to Advances in Applied Math).* `https://arxiv.org/abs/2106.02534`

4. Domagalski, Jinting Liang, Quinn Minnich, Bruce E. Sagan, Jamie Schmidt, Alexander Sietsema - Pinnacle Set Properties, 2021. *(Submitted to Discrete Mathematics).*`https://arxiv.org/abs/2105.10388`

Teaching Experience

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 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

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

Anderson Acceleration and Descattering December 2020
Numerical Analysis final project presentation

Simulating NFL Coaching Decisions Using Machine Learning December 2020
Computational Modeling II final project presentation

Neural Style Transfer and Video Games December 2020
Computational Modeling II honors project 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

An Analysis of Best-Case Scenario Intentional Fouling in the NBA May 2020
Computational Modeling I final project 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
Department of Mathematics Award

Paul and Wilma Dressel Endowed Scholarship 2019
Department of Mathematics Award

FAITH Endowment Scholarship for Academic Excellence 2018-Present
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-Present
University full-tuition scholarship

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

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, Juqbox

Relevant Coursework

Mathematics

- Calculus I,II,III
- Intro to Differential Equations
- Honors Linear Algebra
- Honors Abstract Algebra I, II
- Honors Intro Analysis, Real Analysis
- Graduate Real Analysis (Measure Theory)
- Discrete Mathematics I, II
- Graduate Combinatorics I, II
- Graduate Topics in Algebra (Combinatorics)
- Fourier Analysis
- Graduate Numerical Linear Algebra
- Graduate Numerical Ordinary Differential Equations

Other

- Algorithms and Data Structures
- Computational Modeling and Data Analysis I, II
- Introduction to Data Science
- General Chemistry I, II, Laboratory
- Calculus Concepts Physics I, II
- Introduction to Microeconomics

Extracurricular Activities

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