SEAN GRATE

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	221 Parker Hall	Email:	sean.grate@auburn.edu
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	USA	GitHub:	https://github.com/TheGrateSalmon

EDUCATION

Auburn University, Auburn   August 2020 –Present
Ph.D. candidate, Mathematics

University of Kentucky, Lexington   August 2016 –May 2020
B.S. in Mathematics with minors in History and Classics, *cum laude*

PROFESSIONAL EXPERIENCE

Auburn University Department of Mathematics and Statistics   August 2020–Present
Graduate Teaching Assistant

University of Kentucky Department of Computer Science   May 2019–August 2020
Undergraduate Research Assistant

Researched topics in computer vision under the guidance of Dr. Nathan Jacobs at the University of Kentucky. Used traditional machine learning techniques to estimate flight paths of planes capturing LiDAR data across all of Kentucky, and used deep learning to obtain arbitrary resolutions of point cloud data.

PUBLICATIONS

[3] Nasrin Altafi, Roberta di Gennaro, Federico Galetto, Sean Grate, Rosa M. Miró-Roig, Uwe Nagel, Alexandra Seceleanu, and Junzo Watanabe. "Betti numbers for connected sums of graded Gorenstein Artinian algebras". *Transactions of the AMS* (2024), to appear. arXiv: 2401.10492 [math.AC].

[2] Sean Grate and Hal Schenck. "Betti tables forcing failure of the Weak Lefschetz Property". *Lefschetz properties: Current and New Directions*. Vol. 59. Springer INdAM Series. 2024, to appear. arXiv: 2307.13126 [math.AC].

[1] Hunter Blanton, Sean Grate, and Nathan Jacobs. "Surface Modeling for Airborne Lidar". *IGARSS 2020 - 2020 IEEE International Geoscience and Remote Sensing Symposium*. 2020, pp. 1110–1113. DOI: 10.1109/IGARSS39084.2020.9323522.

PREPRINTS

[5] Ayah Almousa, Shiliang Gao, Sean Grate, Daoji Huang, Patricia Klein, Adam LaClair, Yuyuan Luo, and Joseph McDonough. *The MatrixSchubert package for Macaulay2*. Submitted. 2023. arXiv: 2312.07393 [math.AG].

[4] Haile Gilroy, Sean Grate, and Melinda Lanius. "Graph Theoretic Reflection to Foster Alignment in Coordinated Courses". *International Journal of Mathematical Education in Science and Technology* (2024). Positive referee reports, now in revision.

[3] Nicholas Gaubatz, Sean Grate, and Haile Gilroy. "Minimal Out-Neighborhoods in the F-Lattice". In preparation.

[2]   Sean Grate. "Castelnuovo-Mumford Regularity of Toric Surfaces". In preparation.

[1]   Herman Chau, Spencer Daugherty, Sean Grate, J. Carlos Martínez Mori, and Anna Pun. "The combinatorics of stable Tamari posets". In preparation.

AWARDS AND HONORS

- Auburn University DMS Bennett Fellowship   2023

- Auburn University DMS Research Citation Award   2021, 2022

- Auburn University DMS Teaching Citation Award   2022

- Auburn University COSAM Outstanding GTA Award   2022

- Best Presentation at UK Computer Science Summer Research Program   August 9th, 2019

- University of Kentucky Dean's List   Fall 2016, Spring 2017, Fall 2017, Spring 2019, Spring 2020

- Kentucky Educational Excellence Scholarship (KEES) ($2,225 per year)   2016-2020

- University of Kentucky Provost Scholarship ($1,500 per year)   2016-2020

TEACHING EXPERIENCE

- Instructor of Record
  - MATH 1610 Calculus I   Spring 2022

  - MATH 1120 Precalculus Algebra   Fall 2021

- Recitation Leader
  - MATH 1610 Calculus I   Fall 2022, Spring 2023, Fall 2023

  - MATH 1620 Calculus II   Spring 2024, Fall 2024

- Tutor
  - MATH 1120 Precalculus Algebra

  - MATH 1610 Calculus I

  - MATH 1620 Calculus II

  - MATH 1680 Business Calculus I

CONFERENCE TALKS

- "Castelnuovo-Mumford Regularity of Toric Surfaces", Joint Mathematics Meeting, January 2025

- "Castelnuovo-Mumford Regularity of Toric Surfaces", AMS Fall Central Sectional, September 2024

- "Betti tables forcing failure of the Weak Lefschetz Property", Combinatorial Algebra meets Algebraic Combinatorics (CAAC), January 2024

- "Betti tables forcing failure of the Weak Lefschetz Property", Workshop on Lefschetz Properties in Algebra, Geometry, Topology and Combinatorics, May 2023

SEMINAR TALKS

- "Betti tables forcing failure of the weak Lefschetz property", University of Nebraska-Lincoln, Commutative Algebra Seminar, October 2024

- "Betti tables and Lefschetz properties, University of Nebraska-Lincoln, Commutative Algebra Reading Seminar, October 2024

- "Betti numbers of connected sums of graded Artinian Gorenstein algebras", Purdue University, Commutative Algebra Seminar, October 2024

- "Betti tables forcing failure of the weak Lefschetz property", Purdue University, Student Commutative Algebra Seminar, October 2024

- "Betti tables and Lefschetz properties", University of Kentucky Algebra Seminar, November 2023

- "Lefschetz properties and Artinian rings", McNeese State University Math Seminar, November 2023

- Auburn University

  - "The stable Tamari lattice", Discrete Math Seminar, November 2024

  - "Betti numbers of connected sums of graded Artinian Gorenstein algebras", Algebra Seminar, September 2024

  - "How-To: Making a website", Graduate Student Seminar, August 2024

  - "Betti tables and Lefschetz properties", Algebra Seminar, February 2024

  - "Suturing the severed didactic tetrahedron: Graph-Theoretic reflection to foster alignment in coordinated courses", Auburn University DBER Seminar, February 2024

  - "Leveraging software for mathematics and graduate school", Graduate Student Seminar, September 2023

  - "A brief introduction to tropical geometry", Graduate Student Seminar, August 2022

  - "An overview of topological data analysis", Math Club, February 2022

  - "A brief introduction to tropical geometry", Algebra Seminar, November 2021

  - "Computations in topological data analysis", Graduate Algebra Seminar, August 2021

  - "Tropical algebra", Graduate Algebra Seminar, July 2021

  - "Geometry in noncommutative algebra", First Year Graduate Student Seminar, January 2021

  - "What/Why/How of neural networks", First Year Graduate Student Seminar, November 2020

CONFERENCES AND WORKSHOPS ATTENDED

- Apprenticeship Program in Commutative Algebra — January 2025
- Joint Mathematics Meetings — January 2025
- AMS Fall Central Sectional Meeting — September 2024
- UweFest — August 2024
- AMS MRC on Algebraic Combinatorics — June 2024
- Computational Algebraic Geometry and String Theory — June 2024
- JM Invariant at 60 — May 2024
- Combinatorial Algebra meets Algebraic Combinatorics (CAAC) — January 2024
- SIAM Texas-Lousiana Sectional Meeting — November 2023
- BrianFest — August 2023
- Macaulay2 Week — June 2023
- SLMath Commutative Algebra Summer School — May 2023

- Workshop on Lefschetz Properties in Algebra, Geometry, Topology and Combinatorics   May 2023
- Commutative Algebra in the South (CATS)   April 2023
- SLMath Tropical Geometry Summer School   August 2022

SERVICE

- President of the Mathematics Club at Auburn University   2021-2024
- Secretary for the Auburn University DMS Graduate Student Council   August 2022-August 2023
- Graduate Student Representative on the Auburn University   August 2021-August 2023
  DMS Graduate Student Council

OUTREACH

- Destination STEM   October 2022, October 2023
- Auburn Mathematical Puzzle Challenge (AMP'd)   November 2022
- University of Kentucky Math Club   2016-2020
- Expanding Your Horizons workshop mentor   2019
- Julia Robinson Math Festival volunteer   2019

TECHNICAL STRENGTHS

Software & Tools	Python, Macaulay2, PyTorch, SageMath
Macaulay2 Packages	MatrixSchubert, Permutations