SEAN GRATE

Address:	Department of Mathematics 221 Parker Hall Auburn University, AL 36849 USA	Office: Email: Website: GitHub:	122H Parker Hall sean.grate@auburn.edu seangrate.com 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

- 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
- Tutor
  - MATH 1120 Precalculus Algebra
  - MATH 1610 Calculus I
  - MATH 1680 Business Calculus I

UK Department of Computer Science August 2019–August 2020
Undergraduate Research Assistant
Continued researching the topics studied at the 2019 Computer Vision REU, e.g., estimating flight routes. Also performed research on point cloud resampling via machine learning where the goal is to produce arbitrary resolutions for a given point cloud.

Computer Vision REU May–August 2019
Undergraduate Researcher
REU in computer vision under the guidance of Dr. Nathan Jacobs at the University of Kentucky. Used machine learning to estimate the flight paths of planes capturing LiDAR data across all of Kentucky.

PUBLICATIONS

[1] Sean Grate and Hal Schenck. "Betti tables forcing failure of the Weak Lefschetz Property". In: *Springer INdAM series: The strong and weak Lefschetz properties* (2023), to appear. arXiv: 2307.13126 [math.AC].

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

PREPRINTS

[1] Haile Gilroy, Melinda Lanius, and Sean Grate. "Graph Theoretic Reflection to Foster Alignment in Coordinated Courses". Submitted.

[2] 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*. Submitted. 2024. arXiv: 2401.10492 [math.AC].

[3] 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].

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

INVITED TALKS

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

CONTRIBUTED TALKS

- "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 AND OTHERS

- "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
  - "Castelnuovo-Mumford Regularity of Toric Surfaces", Algebra Seminar, September 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

- 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 DMS Graduate Student Council — August 2021-August 2023

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