

SEAN GRATE

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EDUCATION

Auburn University, Auburn

August 2020 - Present

Graduate Student (Ph.D. Program), 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] 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.
- [2] Ayah Almousa, Shiliang Gao, Sean Grate, Daoji Huang, Patricia Klein, Adam LaClair, Yuyuan Luo, and Joseph McDonough. *The MatrixSchubert package for Macaulay2*. 2023. arXiv: 2312.07393 [math.AG].

- [3] 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].
- [4] 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.

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)

TALKS

- “Betti tables forcing failure of the weak Lefschetz properties”, Combinatorial Algebra meets Algebraic Combinatorics (CAAC), January 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
- “Betti tables forcing failure of the Weak Lefschetz Property”, Workshop on Lefschetz Properties in Algebra, Geometry, Topology and Combinatorics, May 2023
- Auburn University
 - “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

Combinatorial Algebra meets Algebraic Combinatorics (CAAC)	(January 2024)
SIAM Texas-Lousiana Sectional Meeting	(November 2023)
BrianFest	(August 2023)
Macaulay2 Week	(June 2023)
Simons Laufer Mathematical Sciences Institute 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)
Mathematical Sciences Research Institute (MSRI) Tropical Geometry Summer School	(August 2022)

SERVICE AND OUTREACH

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)
Auburn Mathematical Puzzle Challenge (AMP'd) (November 2022)
Destination STEM (October 2022, October 2023)
President of the Mathematics Club at Auburn University (2021-Present)
University of Kentucky Math Club (2016-2020)
Expanding Your Horizons workshop mentor (2019)
2019 Julia Robinson Math Festival volunteer

TECHNICAL STRENGTHS

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