EMILY SAUNDERS

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EDUCATION

Columbia University — New York, NY
PhD in Mathematics — *September 2019 - Present*

Expected Graduation May 2025.

Harvard University — Cambridge, MA
BA in Mathematics — *September 2015 - June 2019*

Graduated *magna cum laude* with highest honors in mathematics. GPA 3.89. Recipient of the Herb Alexander Award for an outstanding undergraduate in the Department of Mathematics.

Relevant Courses

Web Programming with Python and JavaScript, User Interface Design, Artificial Intelligence, Machine Learning, Graduate Analysis & Probability I, Graduate Probability II, Analysis of Algorithms.

PROJECTS

Columbia University — New York, NY
PhD Dissertation

· Wrote a PhD dissertation on a generalization of multi-parameter persistent homology indexed over the product poset $\mathcal{Z} \times \mathbb{R}$. The main contributions of this thesis are defining a metric on the space of $\mathcal{Z} \times \mathbb{R}$ persistence modules, proving stability with respect to the Gromov-Hausdorff distance on compact metric spaces, proving convergence of $\mathcal{Z} \times \mathbb{R}$ persistence modules obtained via bootstrap resampling, constructing invariants on the space of $\mathcal{Z} \times \mathbb{R}$ persistence modules, and adapting Gromov-Prokhorov stability results for density sensitive bifiltrations to the zig-zag setting.

Harvard University — Cambridge, MA
Undergraduate Thesis — *June 2018 - March 2019*

· Wrote an undergraduate thesis advised by Professor Michael J. Hopkins on the Smale-Hirsch theorem in differential topology, based primarily on *Immersion Theory for Homotopy Theorists* by Michael Weiss.

WORK EXPERIENCE

Columbia University — New York, NY
PhD Candidate - Advisor: Andrew J. Blumberg — *September 2019 - Present*

· Developed expertise in probability theory through 2 years of coursework and preparation for qualifying exams.
· Researching generalizations of persistent homology methods used in topological data analysis
· Presented in seminars on topics including infinity category theory, stable homotopy theory and persistent homology.

Columbia University — New York, NY
Instructor — *September 2020 - Present*

· Taught the following courses: Calculus III (Summer 2023), Calculus II (Summer 2022), College Algebra and Analytic Geometry (pre-calculus) (Fall 2021).
· Led 3 undergraduate seminar courses on Combinatorics (Spring 2022), *The Probabilistic Method* by Alon and Spencer (Spring 2021) and Category Theory (Fall 2020). Responsibilities included developing curriculum, preparing students for their talks and lecturing.

· Served as teaching assistant for Modern Analysis (Spring 2025), Calculus III (Fall 2024), Analysis and Optimization (Spring 2024), Linear Algebra (Fall 2023, Spring 2023, Fall 2022, Summer 2021) and Calculus I (Summer 2021).

TECHNICAL SKILLS

Programming Languages	Python, JavaScript
Web Development	HTML, CSS, React, Django
Tools & Frameworks	Git, Bootstrap